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Descriptive Catalogue of South African Decapod Crustacea.

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(With 154 Text-figures.)

A knowledge of the Crustacean fauna of South Africa has been gradually built up, on the basis of the more or less casual collecting of early travellers and voyagers around the Cape, and by later and more intensive collecting by scientific collectors and expeditions. Students of South African Crustacea owe a debt of gratitude to the late Rev. T. R. R. Stebbing, F.R.S., for bringing all these scattered records together into a General Catalogue, which is not merely a fauna-list but has the further merit of containing abundant references to the antecedent literature.*

Moreover, Stebbing himself contributed more to South African carcinology than any previous worker by means of his reports on the collections of the Cape Government trawler s.s. *Pieter Faure* and of the South African Museum,† and in his reports on Natal Crustacea.‡ The last of these reports was published in 1924, and altogether they record some 150 new species and new records additional to those in the 1910 Catalogue.

The Catalogue was not a descriptive catalogue, and consequentiy the identification of South African crabs and prawns, unless illustrated

* Ann. S. Afr. Mus., vi, 1910, pp. 281–593 (Decapoda, pp. 283–395).

† In "Marine Investigations in South Africa," i–iv, 1900–5 (correct date of publication printed at end of each paper, sometimes earlier than date of the bound volume; vol. vi forms part of vol. vi of Ann. S. Afr. Mus.), and Ann. S. Afr. Mus., vi–xix, 1908–24.

‡ In Annals Durban Museum, i–iii, 1917–21.

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in Stebbing's papers, is a difficult matter for anyone not having access to a reference collection such as is preserved in the South African Museum.

To remedy this, the following descriptive account of the Decapod Crustaceans (Crabs, Hermit-crabs, Prawns, Shrimps) has been prepared. Although it contains a considerable number of new records, it is necessarily far from being even an approximately complete list of the actual fauna. The area off the coasts of Zululand and Portuguese East Africa, containing a wealth of Indo-Pacific species, has been very little investigated. Many additions to the fauna-list may be expected from this area. In recent years good work in the littoral and shallow waters has been done by the Zoology Departments of the Universities of the Witwatersrand and Cape Town, the former at Delagoa Bay, the latter at various localities around the coast of the Union of South Africa.

The geographical boundary here adopted is the parallel of 15° S. lat.,* a boundary which coincides approximately with Mossamedes on the west coast and Mozambique Island on the east coast. As thus limited the South African region includes, besides a truly South African area with its own special fauna, a small portion on the west with an Atlantic facies, and a much larger portion on the east with an Indo-Pacific facies. Hard-and-fast boundaries, of course, are not to be laid down, no more than in the case of the currents which largely determine the type of fauna.

It is unfortunate if no more detailed locality can be given than merely "Cape" or "Cape of Good Hope" (these occur, *e.g.*, in Chopra, Rec. Ind. Mus., xxxv, 1933, p. 32, probably translated from Balss, Arch. Naturg., lxxxviii, 1922; Chopra and Das, Rec. Ind. Mus., xxxix, 1937, pp. 384, 385; Balss, Fauna Col. Franç., v, 1934, p. 522). It is not so vague as "S. Africa," and consequently is definitely *misleading*. For example, the species to which the above references apply, do not extend to anywhere near the locality usually understood nowadays as the Cape of Good Hope. These locality names date from the early days when they signified, for both land and sea animals, "Kaffraria," or even the greater part of the region now comprised in the Union of South Africa. To-day, however, we require for purposes of discussion of geographical distribution more precise localities.

In the present work wherever "False Bay" is mentioned, the large

* As in the Monograph of Marine Fishes, Ann. S. Afr. Mus., xxi. See also Stebbing's General Catalogue, p. 326.

bay in the south-west Cape is intended, not the subsidiary bay enclosed within St. Lucia Bay, Zululand.

As in Hilgendorf's paper,* "Mozambique" is to be understood as the Island of Mozambique, not the whole province, which is here referred to as Portuguese East Africa. In spite of Hilgendorf's statement, his records of freshwater *Palaemon* species must refer to a locality on the mainland, as there are no freshwater streams on the island.

Certain anomalies of distribution within South African waters, or the presence of certain European and other species, may possibly be due to transportation on ships' bottoms. The most noteworthy importation seems to be the Crab *Pilumnoides perlatus* (p. 257). This is a South American species which has occurred singly or in small numbers at Plymouth (England) and Queenstown (Ireland), but which occurs in sufficient numbers to breed on the west coast of South Africa. Its occurrence here has only recently been detected, and future observers will note whether it extends its range. Possibly it is not an importation at all.

Within our waters it is possible that *Upogebia capensis* has extended its range from the west coast to Simon's Bay and Mossel Bay by the agency of ships, especially the old wooden ships.

Although the harbour areas, *e.g.* Table Bay, Simon's Bay, Mossel Bay, Algoa Bay, and Durban, are those in which most collecting has hitherto been done, and certain species recorded from these areas may later be found to have a wider distribution, nevertheless species collected only in or near harbours are suspect; † e.g. *Macropodia rostrata*, *Atelecyclus septemdentatus*.

It is perhaps strange that up to the present there is no record in our waters of *Carcinides maenas*, the common shore-crab of Britain, Europe, and the Atlantic coast of North America. In other parts of the world this crab has a rather remarkable distribution which leads one to think that accidental transportation may have occurred.‡

Three large and well-known West Indian Decapods, *Stenocionops furcata*, *Calappa flammea*, and *Petrochirus bahamensis*, were stated to have been captured by H.M.S. *Challenger* in Simon's Bay. But they have never again been reported from South Africa, and Odhner's

* MB. Ak. Wiss. Berlin, 1878, p. 784.

† Stebbing, History of Crustacea, 1893, pp. 98, 99. Chilton, Trans. New Zealand Inst., xliii, 1911, p. 131.

‡ Broekhuysen, Arch. néerl. Zool., ii, pp. 257–399. Chopra and Das, Rec. Ind. Mus., xxxix, 1937, p. 381.

suggestion is eminently reasonable that the records should be regarded as due to an error in labelling, and these species omitted from the South African fauna-list.*

For observations on the geographical distribution, and the composition of the South African fauna, see the works of Ortmann (1894), Weber (1897), Doflein (1904), Odhner (1923).

Except for minor points regarding the identity or synonymy of certain species, the present work contains no new researches. The systematic arrangement is in the main that of Borradaile (1907) and Calman (1909), with slight modifications. The diagnoses of the families, genera, etc. have been compiled from the works of previous authors so far as these have been available in South Africa. Lengthy descriptions of the species have not been given in most cases. The terminology has been kept as simple as possible, but technical terms are often unavoidable. In some places, to save space, abbreviations have been used, *e.g.* ant. for antenna, mx. for maxilla, and mxp. for maxilliped.

The identity of some species is still open to doubt, especially where the South African specimens have been "identified with" a species known from some other region without actual comparison of specimens.

References have as a rule been limited to those later than 1910, except in cases of species not hitherto recorded. References, however, to figures given by Stebbing in South African periodicals, references to McLeay and Krauss, are always given; together with certain other references which the present author has found useful.

All references have been checked as far as the original works are available to me, but in many instances references have been taken from other authors. Sometimes one author's mistake is perpetuated by later authors who have not been able to consult original works, *e.g.* Alcock (J. Asiat. Soc. Bengal, lxvii, p. 101) quotes Milne Edwards' Hist. Nat. Crust., i, p. 377, pl. 16, fig. 14; on referring to the latter work one finds that Milne Edwards himself has given in his text "fig. 14" instead of figs. 1–3, although the explanation of plate 16 is correct (Atlas, p. 15).

It is regrettable that the time (and expense) spent on photographing crabs and shrimps is in most cases wasted. Such photographs when reproduced may be handy for suggesting the family, or perhaps the

* Medd. Göteb. Mus., xxxi, 1923, p. 32. It may be noted that the *Challenger* proceeded from the West Indies to North America, and thence via the Cape Verdes and South America to the Cape, without touching at any home port and, presumably, without disembarking any of her scientific collections.

genus, to which a specimen belongs; but unless the specific characters are very bold and the specimen has been specially set out for the purpose, they are quite useless for the serious study and comparison of specific differences.*

On the other hand, a simple outline drawing, emphasizing the particular specific characters (and occupying perhaps 10–15 minutes to execute), may often be infinitely more helpful to the student. The present work is therefore illustrated by such freehand drawings. Although without artistic pretensions, a certain degree of accuracy may be claimed for them. They are intended to indicate the features which a student should look for when seeking to identify specimens, and which cannot always be appreciated from a verbal description, however explicit.

The material available for the present descriptive account includes pre-eminently that collected by the Cape Government trawler s.s. *Pieter Faure* between the years 1898 and 1907 (dates in the log-book when the vessel was actually at sea collecting), and forming part of the collections of the South African Museum. This collection formed the basis of Stebbing's researches and reports. Many of the actual specimens (types and co-types) named by Stebbing, and, after 1910 when the *Pieter Faure* collection was vested in the South African Museum and the Museum continued the supply of material to Stebbing, the majority of the specimens, have been returned to the Museum.

I have worked through the whole of the *Pieter Faure* material, much of which had never been submitted to Stebbing; and also other material in the Museum derived partly from correspondents and casual donations, partly from collecting by myself (including a visit to Delagoa Bay and Mozambique) and other members of the staff.

Dr. C. J. van der Horst (Witwatersrand University) submitted the material collected by him and his students in the course of several visits to Delagoa Bay. I have also seen the collection made by the late Dr. J. D. F. Gilchrist in the s.s. *Pickle* off the coast of Portuguese East Africa; † and a collection belonging to the Museu Dr. Alvaro de Castro at Lourenzo Marques from the same area.

Dr. T. A. Stephenson (formerly of the University of Cape Town)

* Odhner's photographs of Xanthid crabs (Medd. Göteb. Mus., xxxvii, 1925), where evidently great care has been taken to employ *two* sources of lighting, thus obviating undue shadows which obscure and deform the real shape and sculpture, are an outstanding and pleasing exception to the above complaint.

† Trans. Roy. Soc. S. Afr., xiii, 1926.

submitted the material collected by him and his students in the course of an Ecological Survey around the coast of the Union of South Africa.

The Union Government Fisheries and Marine Biological Survey, under the directorship formerly of the late Dr. Gilchrist, and now of Dr. Cecil von Bonde, has continued the work of the Cape Government Marine Survey, and some of the Crustacea have been briefly reported on by Stebbing (1923), Calman and Hansen (1925).

One of the earliest collections of Crustacea made in this country was that gathered together by Dr. Sir Andrew Smith, founder and first Curator of the South African Museum.* This collection was entrusted by Dr. Smith, on his return to England in 1837, to W. S. McLeay for description in Smith's classic publication "Illustrations of the Zoology of South Africa." McLeay's work was first published in 1838 under the title "Annulosa of South Africa." †

Under what terms the collection of Crustacea was handed over to McLeay is not known, but the collection seems to have been regarded as lost, and while some of the species described by McLeay have been readily recognized by later writers, the identity of others has remained obscure.

In 1937, however, Mr. Melbourne Ward informed me that he had discovered the Smith Collection, including all but five of McLeay's types, in the Australian Museum at Sydney. We must assume, therefore, that McLeay regarded the collection as his own property, and took it with him when he migrated to Australia in 1839, where later he became a Trustee of the Australian Museum.‡

The discovery, after a hundred years, that McLeay's types are still extant, well preserved, and in safe keeping, is a most interesting and important event in the history of South African carcinology.

Although Mr. Ward tells me he intends to publish a report on McLeay's species, giving their modern designations, he has very kindly sent me a set of photographs, from which I have been able to satisfy myself as to the identity of McLeay's species.

Without giving a detailed history of South African Carcinology, the progress in our knowledge of the Crustacean fauna may be

* P. Kirby, Ann. S. Afr. Mus., xxxvi, 1942, p. 1.

† William Sharp Macleay, 1792–1865. R. Etheridge, jun., in Rec. Austral. Mus., xi, 1916, p. 67, says: "In early official documents the family name was spelt M'Leay. . . ." The initials to the preface of the "Annulosa of South Africa" are printed thus: W. S. M'L.

‡ J. J. Fletcher, Macleay Memorial Volume, Linnean Society of New South Wales, p. x, 1893; R. Etheridge, jun., in Rec. Austral. Mus., xii, 1919, p. 394, records W. S. Macleay as Committeeman, 1841–53; Trustee, 1853–62.

indicated by the number of "new species" collected by the more important collectors and expeditions, although, for several reasons, this is not the most reliable index of a collector's energy.

Krauss travelled for a considerable time in this country (1838–40) shore-collecting at various localities; and the Cape Government trawler s.s. *Pieter Faure* over a period of nearly ten years investigated almost the whole of the South African area from the mouth of the Orange River on the west to St. Lucia Bay and Cape Vidal on the east, deep and shallow water. On the other hand, the U.S. Exploring Expedition (1838–42), the U.S. North Pacific Exploring Expedition (1853–56), the *Challenger* (at the Cape, 1873), *Gazelle* (at the Cape, 1874), *Valdivia* (Cape, Agulhas Bank to Port Elizabeth, 1898), *Gauss* (Cape and Durban, 1901 and 1903) paid only comparatively fleeting visits to South African harbours mainly for revictualling and refitting.

Further, the majority of the species in the South African fauna-list have been first collected and described from other regions. Thus one collector may obtain a number of species merely new to the fauna-list, whereas another may just happen to find several "new species." Also progress in taxonomy may sink a supposed n.sp. as a synonym of a species known from another region, or separate the local from the extra-South African species with which it had been included or misidentified.

With these qualifications, however, it may be interesting to note that Smith (McLeay) collected 8 new species, Krauss 15, the U.S. North Pacific Exploring Expedition (Stimpson) 5, the *Valdivia* (Doflein) 2, the *Gauss* (Lenz and Strunck) 1, and the *Pieter Faure* (Stebbing, Barnard) 54 new species. (These figures include, of course, only Decapod Crustacea.)

The most notable of the *Pieter Faure* discoveries were the Giant Stone Crab from deep water off the Cape, and two Palinurids.

In many cases Mauritian species have been included in the keys to species, because some of them may eventually be collected on the South African coast. A regular steamship service between Durban and Mauritius may possibly facilitate transportation. But not all the species recorded from Mauritius have been included, as some of the literature is not available. (See A. Milne Edwards in Maillard's Ile de Réunion, 1862; Richters, 1880; Miers, 1880, 1882, 1884; Bouvier, 1910 and 1915; Ward, 1942.)

Colloquial names for South African crabs, prawns, and shrimps are almost non-existent. As there is such a vast variety of species, many of them indistinguishable from one another except by the specialist,

it is doubtful whether the introduction of such names would be of any practical value. The large crayfishes, and some of the larger and most striking of the commoner crabs, have been given names.

Grateful acknowledgments for assistance in many ways is herewith tendered to: Dr. W. T. Calman (formerly of the British Museum), Dr. Isabella Gordon (British Museum), Dr. Waldo L. Schmitt (U.S. National Museum), Professor C. J. van der Horst (Witwatersrand University, Johannesburg), Professor T. A. Stephenson (formerly University of Cape Town), Mr. Melbourne Ward (Australian Museum, Sydney). I am specially indebted to Dr. Gordon, who has generously devoted a considerable amount of time to checking references and making tracings for me.

To the memory of the Rev. T. R. R. Stebbing, whose unstinted help and encouragement at the beginning (1911) of my studies on South African Crustacea were invaluable, this work is but a small tribute.

As far as possible references to the more important papers, published after the completion of the MS. (31st December 1940), have been inserted. Stephensen in his work on the Brachyura of the Iranian (Persian) Gulf (1945) has given a valuable summary of the male 1st and 2nd pleopods, with a list of hitherto published descriptions and figures of the species arranged systematically. These appendages are essential for the correct identification of crabs.

K. H. B.

31*st March* 1947.

REPTANTIA.

The 5 pairs of abdominal appendages often reduced or absent, never used for swimming. (See Borradaile, 1907.)

BRACHYURA.

Key to the Divisions (Tribes, Subtribes).

I. Mouth-frame (buccal cavity) more or less quadrate (figs. 1–3, 37).
  A. Last pair of legs normal, rarely reduced, and only exceptionally dorsal in position. Female genital openings sternal. 1st pleopod ♀ absent. Gills few . . . *Brachygnatha*, p. 9.
    1. Carapace triangular, narrowed in front, usually a distinct rostrum (figs. 1–15). Orbits generally incomplete . . *Oxyrhyncha*, p. 9.
    2. Carapace broad in front, rostrum reduced or wanting (figs. 16–52). Orbits well developed (figs. 22, 37, 45) . . *Brachyrhyncha*, p. 75.
  B. Last pair of legs modified, situated dorsally. Female genital openings coxal. 1st pleopod ♀ present. Gills usually numerous . . . . . *Dromiacea*, p. 305.

II. Mouth-frame (buccal cavity) triangular (figs. 66–68, 71). Last pair of legs normal or modified. 1st pleopod ♀ absent. Gills few.
  A. Posterior thoracic sternites broad (bases of walking legs far apart). Last pair of legs normal in position, or last two pairs dorsal. Female genital openings sternal (except in *Cyclodorippinae*) . . . . . *Oxystomata*, p. 345.
  B. Posterior thoracic sternites narrow, keel-like (bases of 2nd–4th legs close together). Last pair of legs dorsal in position. Female genital openings coxal . . . . *Gymnopleura*, p. 396.

BRACHYGNATHA.

OXYRHYNCHA. SPIDER-CRABS.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., ii, p. 681 (key to families).

1907. *Id.*, Ann. Mag. Nat. Hist. (7), xix, p. 480 (key to families).

1910. Stebbing, Gen. Cat. S. Afr. Crust., p. 283.

1925. Rathbun, Bull. U.S. Nat. Mus., no. 129, pp. 1–613, pls. and text-figs. (American species).

1929. Balss, Decap. Rot. Meer. "Pola" Ergebn., xxxvi, Denkschr. Ak. Wiss. Wien. Math. Naturw. Kl., cii, pp. 1–30 figs. (classification).

Carapace more or less triangular and narrowed in front, usually produced to form a rostrum. Epistome usually large; buccal cavity quadrate, its anterior margin generally straight. Orbits mostly incomplete. 1st antennae (antennules) folded longitudinally. Female genital openings on sternite of 3rd (*i.e.* 2nd walking) legs; male openings on coxae of last legs (except in *Hymenosomatidae* where they are sternal).

Remarks.—The most notable feature of the great majority of the Spider-crabs is the presence of hooked setae or bristles, by means of which various extraneous substances such as seaweeds, hydroids, sponges, ascidians, polyzoans, etc. are affixed to the carapace and often also the legs, thus affording a very effective concealment (fig. 1).

Key to the Families.

I. Carapace not flat, integument not thin. Chelipeds mobile or powerful with bent fingers. Male genital openings on the 5th coxae.

A. Basal joint of ant. 2 well developed, occupying all the space between socket of ant. 1 and eye (figs. 1, 2, 3, 7, *b*), generally fused with epistome and sometimes also with side of rostrum. Chelipeds usually not vastly larger than other legs.

1. Basal joint of ant. 2 slender (figs. 1, 2, 3). Orbits not defined. Eye-stalks usually long, non-retractile, or retractile against sides of carapace . *Inachidae*, p. 11.

2. Basal joint of ant. 2 stout (fig. 7, *b*).

a. Orbits not defined. Eye-stalks very short or obsolescent, concealed beneath a supra-ocular spine or sunk in sides of the large beak-like rostrum. Basal joint of ant. 2 truncate-triangular (fig. 7, *b*) . . . . . *Acanthonychidae*, p. 35.

b. Orbits partly defined. Post-ocular process always present, hollowed for reception of the short eye-stalks (figs. 11, 12) . . . *Blastidae*, p. 48.

c. Eye-stalks long or short, retractile into distinctly defined orbits (fig. 13, *b*, *c*). . . . *Mamaiidae*, p. 58.

B. Basal joint of ant. 2 very small, not fused with epistome or front. Chelipeds usually much longer and more massive than other legs (fig. 14) . . . . . *Parthenopidae*, p. 63.

II. Carapace flat, integument thin (fig. 15). Chelipeds not long or specially mobile or with bent fingers. Male genital openings on the last thoracic sternite . . . . . *Hymenosomatidae*, p. 66.

Family INACHIDAE.

1910. Stebbing, *l. c.*, p. 283.

The chief characteristic of this family as opposed to the other Oxyrhynch families is the slender basal joint of antenna 2.

Key to the South African Genera.

I. Peduncle of ant. 2 composed of 2 movable joints and a basal immovable joint which is proximally fused with epistome, without distinct suture. Antennal glands more or less distant from the apparent base of ant. 2 (figs. 1, 2, 3). Eyes more or less dumbbell shaped, proximal part of stalk wider than distal part, and cornea more or less enlarged (figs. 1–5).

A. Eye-stalks strongly curved. Free joints of peduncle of ant. 2 densely hairy. Sockets of 1st antennae coalesced into a single cavity (fig. 1) . . *Camposcia.*

B. Eye-stalks nearly straight. Free joints of peduncle of ant. 2 not densely hairy. Sockets of 1st antennae separate (fig. 2).

1. Eyes projecting, non-retractile. No post-ocular tooth. Lower surface of basal joint of ant. 2 convex, smooth or with one or more spines (figs. 2, 3).

a. Rostrum of 2 more or less elongate and contiguous spines (fig. 2) . . . *Macropodia.*

b. Rostrum shortly bilobed or bifid (fig. 3) . *Achaeus.*

2. Eyes retractile. Post-ocular tooth present. Lower surface of basal joint of ant. 2 channelled between 2 rows of spinules (fig. 4).

a. 2nd leg not markedly longer than others. Post-ocular tooth spiniform, not hollowed . . . . . *Achaeopsis.*

b. 2nd leg markedly stronger and longer than others. Post-ocular tooth hollowed . *Inachus.*

II. Peduncle of ant. 2 composed of 3 joints, the basal one of which has a distinct suture at junction with epistome and is more or less freely movable. Antennal glands immediately at base of ant. 2 (fig. 6, *b*).

A. Margin of buccal cavity close behind antennal glands (fig. 6, *b*). Cornea distinctly wider than eye-stalk.

1. Inter-antennular spine very large, project-horizontally, rostrum thus appearing tri-spinose. Eye-stalk short, stout, cornea globular (fig. 6, *a*) . . . . . *Platymaia.*

2. Inter-antennular spine not very large, deflexed. Eye-stalk more or less slender, cornea ovoid (fig. 6, *d*) . . . . . *Cyrtomaia.*

B. Margin of buccal cavity some distance behind antennal glands. Cornea very little wider than eye-stalk . . . . . *Pleistacantha.*

Gen. Camposcia Latr.

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 184.

Carapace pyriform. Rostrum broad, very short, apically indented. A post-ocular tooth. Eye-stalks strongly curved, cornea oblique and not dilated. Sockets of 1st antennae coalesced to form a single cavity. Basal joint of ant. 2 fused to epistome, antennal gland rather near its base, the 2 free peduncular joints flattened and densely hairy. 4th joint of 3rd maxilliped narrower than 3rd, inner apical corner of latter produced, palp moderate. Chelipeds slender, legs long. Abdomen in both sexes with 7 segments, in ♂ almost as broad as in ♀, covering the greater part of sternum.

Camposcia retusa Latr.

Fig. 1.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 784.

1895. Alcock, *l. c.*, p. 184 (references).

1918. Stebbing, Ann. Durban Mus., ii, p. 48.

1942. Ward, Mauritius Inst. Bull., ii, p. 71.

Carapace, chelipeds, and especially the legs densely covered with hooked setae and bristles.

Length of carapace up to 40 mm., breadth 27 mm. The hairy covering more or less reddish.

Localities.—Durban (Stebbing); Delagoa Bay (S. Afr. Mus.); Mozambique (Hilgendorf, Miers).

Distribution.—Mauritius; Ibo, Portuguese East Africa; Chagos; Indo-Pacific.

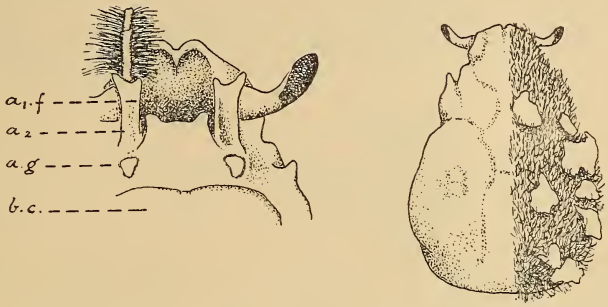


Fig. 1.—*Camposcia retusa* Latr. Lower surface of rostrum, 1st antennæ removed from socket $a_1.f.$ a_2, 2nd antenna. *a.g.*, antennal gland. *b.c.*, buccal cavity. Upper surface of carapace, left side cleaned, right side with hairs and pieces of seaweed.

Gen. Macropodia Leach

1899. M. Edwards and Bouvier, Res. Sci. Camp. Monaco, xiii, p. 47 (*Stenorhynchus* non Lam.) (key to N. Atlantic species).

1910. Stebbing, *l. c.*, p. 284.

1911. Rathbun, Tr. Linn. Soc. Lond., xiv, p. 242.

1927. Lebour, J. Mar. Biol. Assoc. Plym., n.s., xiv, p. 806, figs. (larval stages).

Carapace pyriform or triangular, with distinct "neck" (especially in ♂) behind the projecting, non-retractile eyes. Rostrum elongate (usually), of two slender contiguous spines. Cornea oblique, with apical tubercle or seta. Abdomen with 6 segments in both sexes. Chelipeds considerably larger in ♂ than in ♀; legs very long and slender.

Remarks.—A genus with several very closely allied species. *Stenorhynchus* Lam. has a simple spiniform rostrum (Rathbun, 1925, *l. c.*, pp. 11, 13).

S. seticornis (Herbst) (=*sagittarius* Fabr.) has been recorded by Odhner from Port Alexander (Medd. Göteb. Mus., xxxi, p. 19).

Key to the South African Species.

1. Outer rims of antennular sockets not splayed outwards. No spines on basal joint of ant. 2. Rostrum short (fig. 2, *a*) . . . . . *rostrata.*

2. Outer rims of antennular sockets splayed outwards, partly covering basal joint of ant. 2 (fig. 2, *b*, *j*).
   a. Rostrum very long. Basal joint of ant. 2 with one spine. Dactyls of 4th and 5th legs with spines along whole inner margin . . . . . *falcifera*.
   b. Rostrum short. Basal joint of ant. 2 without or with 2 spines. Dactyls of 4th and 5th legs with spines only on proximal half of inner margin . . *formosa* and var.

Macropodia rostrata (Linn.)

European Long-legged Spider-crab.

Fig. 2, *a*.

1849. Cuvier, Règne Anim. Crust., pl. 35, figs. 3, 3, *a–g* (*Stenorhynchus phalangium*).

1853. Bell, Brit. Stalk-eyed Crust., p. 2, fig. (*S. phalangium*).

1899. M. Edwards and Bouvier, *l. c.*, pp. 48, 49 (*S. rostratus*).

1904. Doflein, Wiss. Erg. D. Tiefsee Exp., vi, p. 69 (*S. rostratus*).

1908. Lagerberg, Göteb. Vet. Samh. Handl. (4), xi, p. 82.

1914. Lenz and Strunck, D. Südpol. Exp., xv, p. 272 (*S. rostratus*).

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 78, pl. 5, figs. 6–8 (*S. rostratus*).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 18.

Rostrum short, not reaching beyond last peduncular joint of ant. 2. Outer rims of antennular sockets not splayed outwards. Epistome and basal joint of ant. 2 without spines or tubercles (Bell: a very minute tubercle on epistome in front of antennal gland). 4th joint of 3rd maxilliped oval, subequal to 3rd joint (excluding internal process of latter). Basal joint of ant. 1 with a few spinules near insertion of 2nd joint. Cornea with apical seta. Dactyls of 4th and 5th legs with about 12–15 recurved spines concealed in fur along whole length of inner margin. Sternum of ♂ with a few inconspicuous tubercles as in *falcifera*.

Length (incl. rostrum), ♂ 17 mm., ♀ 12 mm.; breadth, ♂ 10 mm., ♀ 9 mm., cheliped ♀ 26 mm. Pink or reddish, chelipeds and legs often darker red.

Locality.—Simon's Bay (Lenz and Strunck).

Distribution.—N. Atlantic and Mediterranean, to Madeira, Canaries, Cape Verdes, Senegal, and off mouth of Congo R.; Port Alexander, Angola. 0–108 metres.

Remarks.—The single record from Simon's Bay (part of False Bay), albeit based on several specimens, might perhaps have been regarded

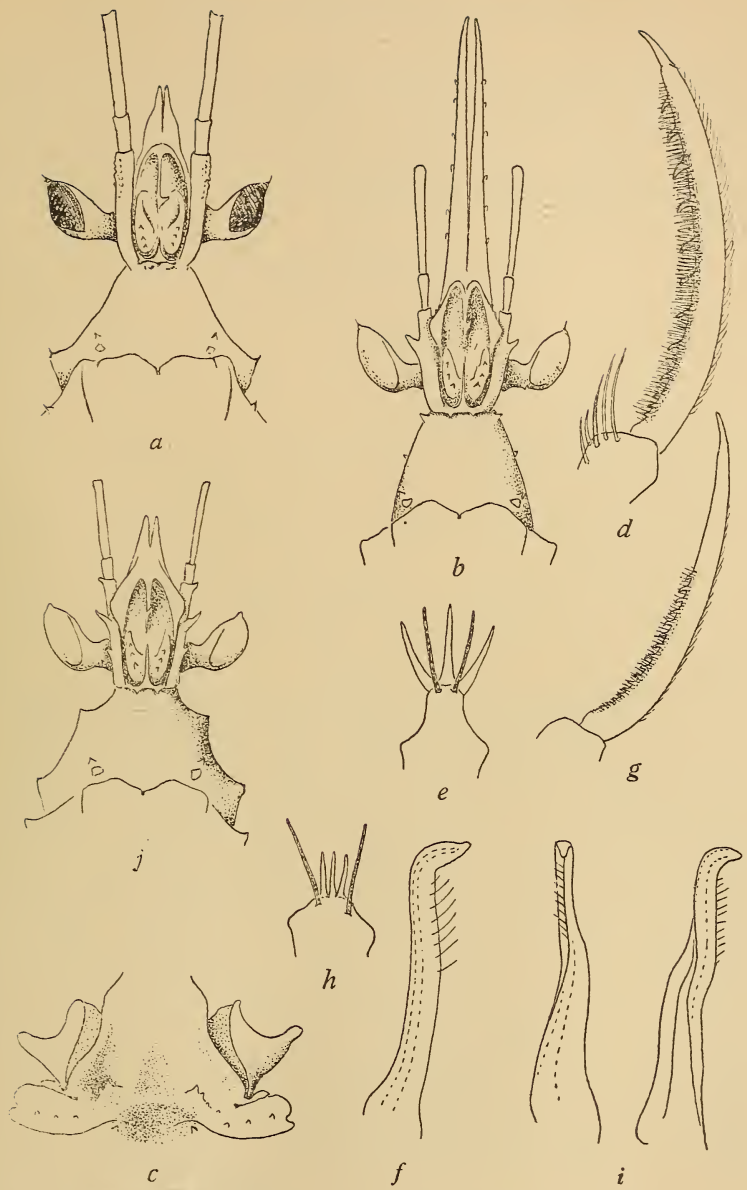


FIG. 2.—*Macropodia rostrata* (Linn.). *a*, ventral surface of rostrum. *Macropodia falcifera* (Stimpson). *b*, ventral surface of rostrum ♂. *c*, sternum ♂ between chelipeds. *d*, dactyl of 4th or 5th leg (some of the setae on apex of 6th joint omitted). *e*, apex of 4th joint of 2nd leg. *f*, 1st pleopod ♂. *Macropodia formosa* Rathbun. *g*, dactyl of 4th or 5th leg. *h*, apex of 4th joint of 2nd leg. *i*, 1st pleopod ♂. *Macropodia formosa* var. (S. Afr. Mus., No. A1412). *j*, ventral surface of rostrum ♀. (In *a*, *b*, *j* only the basal joint of 1st antenna is indicated.)

as due to transportation by ships, because the *Pieter Faure* obtained no examples during the course of a fairly intensive survey of False Bay. Recently (1946), however, the University of Cape Town Ecological Survey, under Professor J. H. O. Day, has rediscovered this species in False Bay, 4–15 fathoms; also found in Knysna harbour (1947).

Macropodia falcifera (Stimpson)

Cape Long-legged Spider-crab.

Fig. 2, *b–f*.

1910. Stebbing, *l. c.*, p. 284.
1913. Balss, Schultze Reise Südafr., v, p. 109.
1914. Lenz and Strunck, *l. c.*, p. 273 (*Stenorhynchus f.*).
1923. Odhner, *l. c.*, p. 26.

Rostrum very long, extending well beyond end of peduncle, usually to end of flagellum, of ant. 2. Carapace with a single large erect spine on the gastric and one on the cardiac region, and smaller spines or tubercles on the other regions. Outer rims of antennular sockets splayed outwards, sometimes minutely denticulate. Two small tubercles on posterior rim of sockets, one at base of ant. 2 (usually present in ♂, usually absent in ♀) and one in front of antennal gland. Cornea with apical setiferous tubercle. Basal joint of ant. 1 with 2–3 minute tubercles. Basal joint of ant. 2 with a single spine in middle of its ventral margin. 4th joint of 3rd maxilliped oval, subequal to 3rd joint (excluding inner projection of latter). Cheliped covered with short thick fur, with longer bristles, the joints spinose along upper and lower margins, a strong spine on outer apex of 4th joint, finger and thumb channelled externally, in ♀ inner margins denticulate and contiguous, in ♂ with large gap proximally, each with a squarish tooth at base, apically denticulate and contiguous. 2nd–5th legs with curled hairs and straight bristles, a spinous process at apex of 4th joint, usually trifid in 2nd leg, trifid or bifid in 3rd and 4th, bifid or simple in 5th leg; dactyls of 2nd and 3rd legs elongate, nearly straight, with short bristles, of 4th and 5th legs slightly, sometimes strongly falcate, with about 12–15 recurved spines concealed in short fur along whole length of inner margin; apex of 6th joint of 4th and 5th legs expanded, with a brush of stiff bristles on inner side. Sternum of ♂ with 2 tubercles, often bifid, or with subsidiary denticles, between bases of chelipeds, and several smaller ones on the lateral portions of the following segments.

Length (incl. rostrum), ♂ 25 mm., ♀ 20 mm.; breadth, ♂ 13 mm., ♀ 10 mm.; cheliped ♂ 46 mm., ♀ 22 mm., longest leg ♂ 82 mm., ♀ 56 mm. Brick-red (Stimpson); cream, pinkish, or reddish, the chelipeds and legs often deeper red.

Localities.—Simon's Bay (Stimpson, Miers, Balss, Lenz and Strunck); St. Francis and Plettenberg Bays, Agulhas Bank (Doflein); Agulhas Bank (Odhner); False Bay and Agulhas Bank eastwards to East London, 17–53 fathoms (S. Afr. Mus.).

Remarks.—A strongly falcate dactyl on the 4th or 5th legs is regarded by Bouvier (*l. c.*) as a variation, but in the genus *Achaeus* it is given specific value (Alcock, 1895). Of 36 specimens of this species not one has strongly falcate dactyls.

This species is common on the Agulhas Bank, extending to about East London, whence northwards its place is taken by *formosa*. At one station, 32° 53′ S., 28° 11′ E., two specimens of *falcifera* and one of *formosa* were taken by the *Pieter Faure* in the same haul.

Macropodia formosa Rathbun

Fig. 2, *g–i*.

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 242, fig. 1.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

Rostrum short, not extending to end of last joint of ant. 2. Carapace as in *falcifera*. Outer rims of antennular sockets splayed outwards; 2 minute tubercles on posterior rim. A small tubercle in front of antennal gland. Cornea with apical tubercle. Basal joint of ant. 2 quite smooth. Basal joint of ant. 1 with minute tubercles. 4th joint of 3rd maxilliped oval, subequal to 3rd joint. Cheliped as in *falcifera*, but less strongly spinose. Apices of 4th joints of legs with 3 small spines on 2nd and 3rd, 2 or one (very small) on 4th and 5th legs. Dactyls of 4th and 5th legs slightly falcate (♀), with a dozen or more recurved spines concealed in short fur on proximal half of inner margin, distal half smooth and glabrous; in ♂ much more slender, with fewer and less conspicuous spines on proximal third of inner margin. Inner apices of 6th joint of 4th and 5th legs with brush of stiff bristles.

Length, ♂ 12 mm., ♀ 14 mm.; breadth, ♂ 7 mm., ♀ 10 mm. One young ♂, which is unusually free from encrusting hydroids, etc., is pale biscuit colour, with a sienna-brown lateral stripe extending from base of 3rd leg to eye and along side of rostrum, peduncle and flagellum

of antenna 2 also brown; chelipeds and legs faintly pinkish. Other specimens, as far as the carapace is visible, are uniformly drab or greyish.

Localities.—Delagoa Bay (Barnard, 1 ♀ 1912; also coll. van der Horst, 2 ♂♂, 1 ovig. ♀ 1939); off East London, and Tugela River, Natal, 24–41 fathoms, 2 ♀♀ (S. Afr. Mus.).

Distribution.—Cargados Carajos (between Mauritius and Seychelles).

Remarks.—These specimens are assigned to *formosa* mainly on geographical reasons. The original description does not mention the basal joints of either antenna 1 or 2, nor the flange of the antennular sockets, nor the armature of the dactyls of 4th and 5th legs. The apices of 4th joints of 2nd–5th legs each have a single, apparently well-developed spine (*cf.* Rathbun's figure).

Two ♀♀, 13 × 10 and 15 × 11·5 mm., differ from the above ♀♀ in having 2 strong spines on basal joint of antenna 2, and the outer apex of the same joint somewhat spiniform (fig. 2, *j*) (S. Afr. Mus., No. A1412).

Locality.—Off Tugela River, Natal, 36 fathoms.

Gen. Achaeus Leach

1886. Miers, *Challenger* Rep., xvii, p. 8.
1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 169.
1902. de Man, Abh. Senckenberg. Ges., xxv, p. 654.
1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 244.
1929. Balss, *l. c.*, p. 5.

Differs from *Macropodia* only in having a very short bifid or bilobed rostrum. The dactyls of 4th and 5th legs are, in some species, rather strongly falcate.

Key to the South African Species.

1. Peduncle of ant. 2 smooth or with minute denticles.
   a. Dactyls of 4th and 5th legs falcate, inner margins spinulose.
      i. Carapace quite smooth. Eye-stalk without tubercle on front margin . . . . *lacertosus.*
      ii. Carapace with slight elevation on cardiac region. Eye-stalk with strong tubercle on front margin . . . . . *affinis.*
   b. Dactyls of 4th and 5th legs nearly straight, inner margins smooth. Eye-stalk without tubercle. Carapace tuberculate . . . . . *laevioculis.*
2. Peduncle of ant. 2 strongly spinose . . . . *lorina.*

Achaeus lacertosus Stimpson

Fig. 3, *a*, *b*.

1857. Stimpson, Pr. Ac. Nat. Sci. Philad., p. 218.

1884. Miers, Zool. "Alert," p. 188.

1895. Alcock, *l. c.*, p. 172.

1907. Stimpson (ed. Rathbun), Smithson. Misc. Coll., xlix, p. 20, pl. 3, fig. 7.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 98, fig. 18, C (plp. 1, ♂).

Rostrum short, bilobed, upper surface with 2 longitudinal ridges. Supra-ocular ridge smooth. Carapace quite smooth, but the regions fairly well defined. Hepatic region with a blunt horizontal laminar tooth. Basal joint of ant. 2 smooth. Inter-antennular tooth obsolete. Eye-stalks not very stout, without tubercle on front margin. Cheliped with 4th joint considerably swollen, finger and thumb not gaping at base. 4th joint of 2nd–5th legs without apical spines. Dactyls of 4th and 5th legs very strongly falcate (semicircular), inner margins with recurved spinules. Sternum of ♂ as figured for *affinis* (fig. 3, *f*).

Length 6 mm., breadth 4 mm. Dark yellowish or brownish, a red ring around middle of finger and thumb of chelipeds.

Localities.—Durban Bay (S. Afr. Mus.); Delagoa Bay (coll. van der Horst).

Distribution.—New South Wales and N. Australia; Indian Seas and Andaman Islands; Persian Gulf.

Remarks.—The 1st pleopod of ♂ seems to be unusual in that the apex curves inwards towards its fellow, instead of outwards; all three ♂♂ were alike in this respect.

Achaeus cf. *affinis* Miers

Fig. 3, *d–f*.

1884. Miers, Zool. "Alert," p. 188.

1893. Henderson, Trans. Linn. Soc. Lond., v, p. 341.

1894. Ortmann, Semon's Austral. Reise, v, p. 37.

1895. Alcock, *l. c.*, p. 172.

1905. Nobili, Boll. Mus. Zool. Univ. Torino, xx, no. 506, p. 7.

1931. Chopra, Rec. Ind. Mus., xxxiii, p. 323.

Rostrum very short, scarcely extending beyond apex of 2nd joint of ant. 2, very shortly bifid. Carapace uneven, but the regions

not very well defined; gastric region convex but not tuberculate; cardiac region with a low elevation bearing 2 minute setiferous tubercles. Outer rims of antennular sockets splayed outwards distally. Tubercles on posterior rim of sockets very minute or obsolete. A minute tubercle in front of antennal gland. Tooth on the inter-antennular septum short and blunt, not spiniform. No spine (or a very minute one) on upper margin of orbit. Cornea with apical tubercle, a conspicuous setiferous tubercle on front margin of stalk, larger in ♀ than in ♂. Basal joint of ant. 1 with several minute tubercles. Basal joint of ant. 2 with 2–3 minute tubercles, better developed in ♀ than in ♂, 2nd joint also with 2–3 tubercles, one of which is almost spiniform. 3rd and 4th joints of 3rd maxilliped subequal in length, feebly setose, both with 2 rows of rather conspicuous spinules. Cheliped not furry, or only feebly so, feebly spinose, no strong spine at outer apex of 4th joint, finger and thumb as in *M. falcifera*, but in ♂ the finger has 2 conical teeth in the gap. 4th joints of 2nd–5th legs without spines, only bristles, at their apices; dactyls of 4th and 5th legs about half length of 6th joint, strongly falcate, with 7–8 recurved spines concealed in fur along the whole length of inner margin, the apical one immediately next the unguis. Sternum of ♂ with prominent flanges at bases of chelipeds, and a crescentic, denticulate ridge between them. 1st pleopod ♂ resembling that of *M. falcifera* (fig. 2, *f*).

Length, ♂ 9 mm., ♀ 75 mm.; breadth, ♂♀ 5·5 mm.

Locality.—Off Cape Morgan, 36 fathoms, 3 ♂♂, 1 ovig. ♀ (S. Afr. Mus.).

Distribution.—Australia; Malay Archipelago; Burma; Andaman Is.; Zanzibar.

Remarks.—These four specimens are very close to, if not actually identical with, *affinis*; Miers says the cardiac prominence is usually very much elevated, which it is not in these specimens. In one ♂ the rostrum is much blunter, almost truncate, with a short slit. Possibly these specimens are *brevifalcatus* Rathbun 1911, from the Seychelles.

Achaeus cf. *laevioculis* Miers

Fig. 3, *c*.

1884. Miers, Zool. "Alert," p. 520, pl. 46, fig. A.

Rostrum very short, not extending beyond apex of 2nd joint of ant. 2, in two of the specimens with slight apical notch and on dorsal

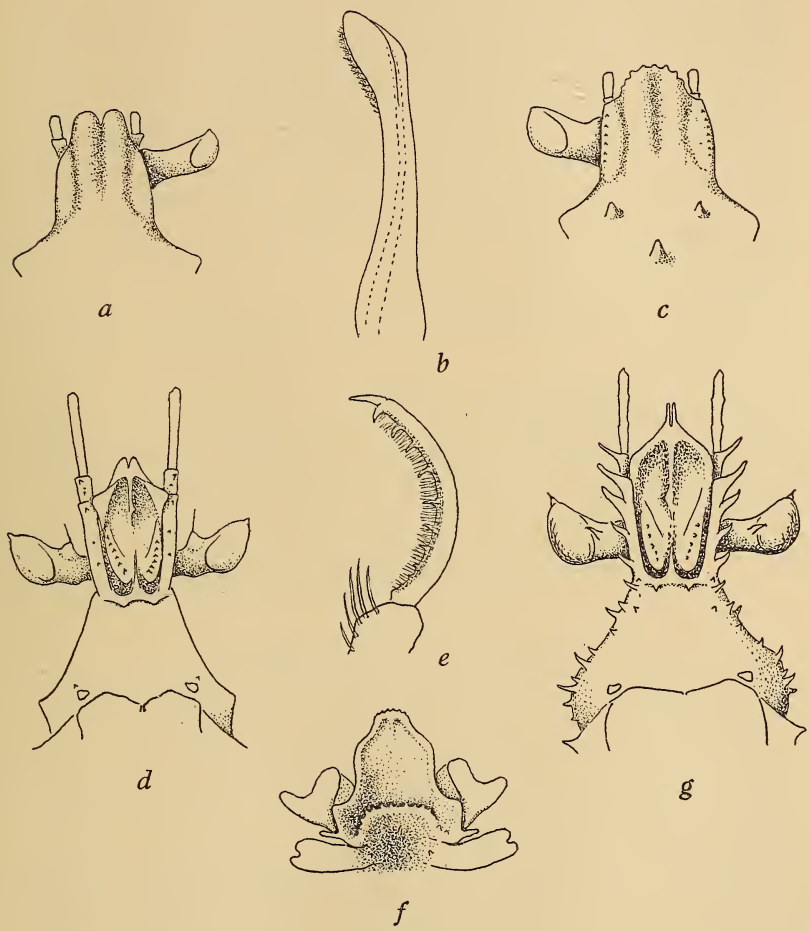


Fig. 3.—*Achaeus lacertosus* Stimpson. *a*, rostrum ♂. *b*, ventral view of left 1st pleopod ♂ (curves inwards towards its fellow).
Achaeus cf. *laevioculis* Miers. *c*, rostrum ♀.
Achaeus cf. *affinis* Miers. *d*, ventral surface of rostrum ♂. *e*, dactyl of 4th or 5th leg (some setae on apex of 6th joint omitted). *f*, sternum ♂ between chelipeds.
Achaeus cf. *lorina* (Ad. & White). *g*, ventral surface of rostrum ♂.
(In *d* and *g* only basal joint of 1st antenna indicated.)

surface a submarginal row of minute denticles, in the 3rd specimen this denticulate ridge forms the anterior rounded margin of rostrum. Supra-ocular ridge minutely denticulate. Carapace with 3 tubercles on gastric region, 2 on each branchial region, and a double tubercle on cardiac region, with (in 2 specimens) a single median smaller tubercle behind it; hepatic region with a blunt horizontal tubercle. Basal joint of ant. 2 feebly denticulate. Interantennular tooth obsolete. Eye-stalks stout, without tubercle on front margin, apex of cornea rounded, with very feeble denticle. 4th joints of 2nd–5th legs without apical spines. Dactyls of 4th and 5th legs nearly straight, inner margins smooth.

Length 7 mm., breadth 6 mm.

Locality.—Off Port Shepstone, Natal, 24 fathoms, 3 ovig. ♀♀ (S. Afr. Mus.).

Distribution.—Seychelles, 4–12 fathoms.

Remarks.—These specimens appear to be nearest to this species which was described from a ♂, the figure of which shows better marked indents behind the eyes and the hepatic regions, and also longer legs.

Achaeus cf. *lorina* (Adams & White)

Fig. 3, *g*.

1848. Adams and White, Zool. "Samarang," Crust., p. 3, pl. 2, fig. 2 (*Inachus l.*).

1886. Miers, *Challenger* Rep., xvii, p. 10.

1900. Lanchester, Proc. Zool. Soc. Lond., p. 721.

1902. de Man, *l. c.*, p. 654.

1911. Rathbun, *l.* c., p. 244.

Rostrum short, ending in two short contiguous points, dorsally with slight median groove. Supra-orbital ridge with strong spine. No post-ocular constriction. Carapace with well-defined regions, gastric region with 2 spines antero-laterally and one median posteriorly, cardiac region with 1 median, branchial region with 1 spine anteriorly, 1 posteriorly, and a smaller one behind the latter and somewhat nearer the middle line; several sharp spinules laterally on hepatic and branchial regions; one spine on pterygostomial region at end of a slight ridge from corner of buccal cavity; some small denticles on sides of epistome, and one on hind margin of each antennular socket. Inter-antennular tooth blunt. Basal joint of ant. 2 with 4 strong spines, increasing in size distally, first free joint with 1 spine on outer

apex. Eye-stalks stout, a curved tubercle on antero-inferior apex just before the cornea, and a small setiferous tubercle at apex of cornea. Cheliped stout, 4th–6th joints swollen, with numerous spines and denticles, finger and thumb gaping in basal half, each with a strong basal tooth, distal margins (where they meet) denticulate. 4th joint of 2nd–5th legs with a single conspicuous spine on apex, and also a seta. Dactyls of 4th and 5th legs slightly falcate, more so in 5th than in 4th, inner margin with about 8 denticles, and a strong one next the unguis; no brush of setae on inner apex of 6th joint. Dactyl of 3rd leg also with a strong denticle next the unguis. Sternum of ♂ similar to that figured for *affinis*, but the crescentic ridge not so well marked; abdomen and sternites between abdomen and bases of legs denticulate. 1st pleopod ♂ as in *affinis* (and *M. falcifera*).

Length 10 mm., breadth 8·5 mm.

Locality.—Off Hood Point (East London), 49 fathoms, 1 ♂ (S. Afr. Mus.).

Distribution.—Philippine Is.; Singapore; East Indies; Amirante and Seychelles.

Remarks.—Agrees in many respects with de Man's description of young ♂, except that the rostral points are not divergent. I have not seen the original description and figure.

Gen. Achaeopsis Stimpson

1910. Stebbing, *l. c.*, p. 285 (and *Dorynchus*).
1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 257.
1917. *Id.*, Ann. S. Afr. Mus., xvii, p. 24.
1932. Sakai, Sci. Rep. Tokyo Zool. Inst., sect. B, no. 4.

Rostrum bispinose, better developed than in *Achaeus*. Inter-antennular tooth strong. Eyes retractile, but the post-ocular tooth is spiniform, not hollowed. Antennular sockets very large, excavated in underside of rostral spines. Basal joint of ant. 2 ventrally channelled between two rows of spinules. 4th joint of 3rd maxilliped shorter than 3rd. Chelipeds much larger in ♂ than in ♀, finger and thumb in ♂ not gaping at base. Legs long and slender, dactyls nearly straight.

Key to the South African Species.

1. Rostral spines relatively short, extending to end of peduncle of ant. 2. Spines at apices of 4th joints of 2nd–5th legs minute or obsolete. Smaller, shallow-water species . *spinulosus.*

2. Rostral spines longer, extending distinctly beyond apex of peduncle of ant. 2. Spines at apices of 4th joints of 2nd–5th legs well developed. Larger, deep-water species . . . . . *thomsoni.*

A. *güntheri* is here transferred to the genus *Inachus.*

Achaeopsis spinulosus Stimpson

Fig. 4, *a–c, e.*

1910. Stebbing, *l. c.*, p. 285.

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 453.

Rostral spines rather short, extending to end of, or very slightly beyond, apex of peduncle of ant. 2, slightly divergent and rather widely separated proximally. A supra-ocular spine, occasionally with a subsidiary spinule in front of or behind it. A strong erect median spine on gastric region, and a stronger one on cardiac region; a smaller tubercle or spine on antero-lateral portion of gastric region; one on the branchial region and often another on the anterior branchial region; lateral margin of branchial and hepatic regions each with 2–3 spinules. Eye-stalk with 1–2 minute spinules or tubercles in middle of anterior surface, and one at anterior apex. 3rd and 4th joints of 3rd maxilliped with 2 rows of spinules, a strong spine on inner margin of 4th joint. Cheliped in fully grown ♂ may be considerably enlarged, hand inflated and longer than finger and thumb. 4th joint of 2nd–5th legs may have 1–3 minute spinules at apex, but never conspicuous. Dactyls of 4th and 5th legs with about 6 minute, widely spaced denticles on inner margin, the largest immediately next the unguis. Sternum ♂ with more or less denticulate flanges at bases of chelipeds, and a slightly crescentic transverse ridge between them, on which are 2 erect widely separated spines and a variable number of subsidiary spinules or denticles, margin of the hollow in which the abdomen lies never trilobate. 1st pleopod ♂ strongly sigmoid, apex with a membranous reflexed flap on ventral side.

Length, ♂ up to 12 mm., ♀ 10 mm.; breadth, ♂ 11 mm., ♀ 8·5 mm.; length of cheliped, ♂ up to 35 mm. Pale brownish orange, chelipeds of a deeper tint, margins of finger and thumb white.

Localities.—Simon's Bay, 10–20 fathoms (Stimpson, Miers); off Cape Recife, 52 fathoms, and off Port Shepstone, Natal, 24 fathoms (Stebbing); off Cape Point, 80 fathoms, off Hout Bay, False Bay, and Agulhas Bank to Durban, 23–100 fathoms (S. Afr. Mus.).

Remarks.—A large ♂ (14 × 12 mm., cheliped 47 mm.) is labelled

"Hoets [*sic*] Bay 24/xii/97"; apparently intended for Hout Bay on the west coast of the Cape Peninsula. This single record from the west coast is linked up with the False Bay and Agulhas Bank records by an even larger ♂ (17 × 14 mm., but cheliped only 25 mm.) from off Cape Point.

This species lives in shallower water than *thomsoni*. It has been taken in association with *I. güntheri*, from which it is distinguished by the *three gastric* spines, the median one *erect* (not curving forwards), and the simply concave margin of the sternal hollow in which the abdomen lies.

Achaeopsis thomsoni (Norman)

Fig. 4, *d*, *e*.

1910. Stebbing, *l. c.*, p. 286.
1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 247 (var.).
1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 258.
1917. *Id.*, Ann. S. Afr. Mus., xvii, p. 24, pl. 1 (Crust., pl. 90).
1918. Rathbun, Biol. Res. "Endeavour," v, p. 4.
1924. Stebbing, Ann. S. Afr. Mus., xix, p. 1.
1925. Rathbun, Bull. U.S. Nat. Mus., no. 129, p. 29, fig. 7 (legs too hairy), and pl. 10.
1927. Hale, Crust. S. Austral., pt. 1, p. 124, fig. 120 (legs too hairy).

Very closely allied to *spinulosus*, but attaining a larger size, and distinguished as follows: rostral spines longer, almost contiguous, or subparallel, or slightly divergent distally, but always closer together proximally than in *spinulosus*, and always extending distinctly (though not far) beyond apex of peduncle of ant. 2. Subsidiary denticles or spinules usually developed on sides or under surface of rostral spines, and near some or all of the major spines on the carapace, including the supra- and post-ocular spines; and the ridges from bases of rostral spines to the inter-antennular tooth are almost always denticulate. Basal joint of ant. 2 with distinct apical spine. The spines of the ♂ sternum, and on the 4th joints of 2nd–5th legs, are more prominent. 1st pleopod ♂ as in *spinulosus*.

Length up to ♂ 30 mm., ♀ 20 mm.; breadth, ♂ 21 mm., ♀ 14 mm.; length of cheliped, ♂ 75 mm., ♀ 25 mm. Fingers and thumbs of chelipeds with salmon-red spots, walking legs with wide bands of same colour but fainter. M. Edwards and Bouvier (1899, Res. Sci. Camp. Monaco, xiii, p. 46, pl. 1, fig. 6) give a coloured figure showing the

whole animal orange-salmon, deeper in tint on the carapace and chelipeds.

Localities.—Agulhas Bank, 150 fathoms (Miers); shallow water and 155 metres (Doflein); off Table Bay and Cape of Good Hope, 106–318 metres (Doflein); off Saldanha Bay and Cape Point, 166 fathoms

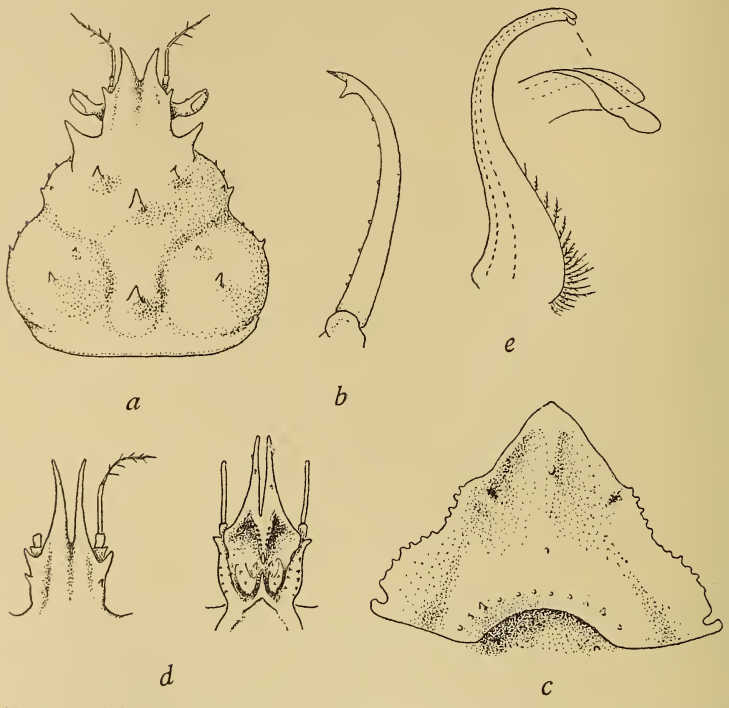


Fig. 4.—*Achaeopsis spinulosus* Stimpson. *a*, carapace. *b*, dactyl of 5th leg. *c*, sternum ♂ between chelipeds.
Achaeopsis thomsoni (Norman). *d*, dorsal and ventral views of rostrum; in latter only basal joint of ant. 1 is indicated, and flagellum of ant. 2 omitted. *e*, 1st pleopod ♂ (similar in both species).

(Stebbing); off Saldanha Bay, Table Bay, and Cape Point, 95–210 fathoms (S. Afr. Mus.).

Distribution.—Widely distributed in Atlantic and Indian Oceans, to S. and S.E. Australia (see chart in Doflein, 1904, D. Tiefsee Exp., vi, p. 273, fig. 61), from about 55 to over 1000 fathoms.

Remarks.—A common species on the Stock-fish grounds in the moderately deep water off the south-west coast, associated with *Scyramathia hertwigi*, and the Dromiid crabs *Exodromidia spinosa* and *bicornis*.

Gen. Inachus Fabr.

1886. Miers, *Challenger* Rep., xvii, p. 19.

1899. M. Edwards and Bouvier, Res. Sci. Camp. Monaco, xiii, p. 44 (key to N. Atlantic species).

1910. Stebbing, *l. c.*, p. 284.

? 1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 247 (*Pseudocollodes*).

Rostrum short, bilobate. Eyes retractile, post-ocular tooth hollowed. Basal joint of ant. 2 ventrally channelled between 2 rows of spinules. Chelipeds much stronger in ♂ than in ♀, finger and thumb not gaping. Legs long and slender, the 2nd pair (1st walking legs) longer and stronger than the following pairs, all dactyls nearly straight. Abdomen with 6 segments in both sexes.

Remarks.—A curious callosity is found on the sternum of the ♂ of two European species and in both sexes of a third species.

Key to the South African Species.

1. A single gastric spine, much larger than the cardiac and branchial spines . . . . . *güntheri.*
2. A row of 4 small tubercles in front of the median gastric spine, which is not much larger than the cardiac and branchial spines . . . . . *dorsettensis.*

Inachus güntheri (Miers)

Fig. 5, *a–c.*

1879. Miers, Ann. Mag. Nat. Hist. (5), iv, p. 2, pl. 4, fig. 1 (*Achaeopsis g.*).

1904. Doflein, D. Tiefsee Exp., vi, p. 74, pl. 28, figs. 2, 3 (*I. antarcticus*).

1910. Stebbing, *l. c.*, p. 284 (*I. antarcticus*) and p. 285 (*Achaeopsis güntheri*).

1914. Lenz and Strunck, D. Südpol. Exp., xv, p. 273, pl. 12, figs. 1–4 (*I. antarcticus*).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 26 (*I. antarcticus*).

Rostrum extending to about middle of last peduncular joint of ant. 2. Inter-antennular tooth not prominent, often quite blunt and inconspicuous. A small supra-ocular spinule, often very inconspicuous. A single large forwardly curving gastric spine; a small

spine or tubercle on each branchial region and on the cardiac region, the latter frequently with a low blunt transverse tubercle behind it. Lateral margin of hepatic region variably spinulose. Eye-stalk with

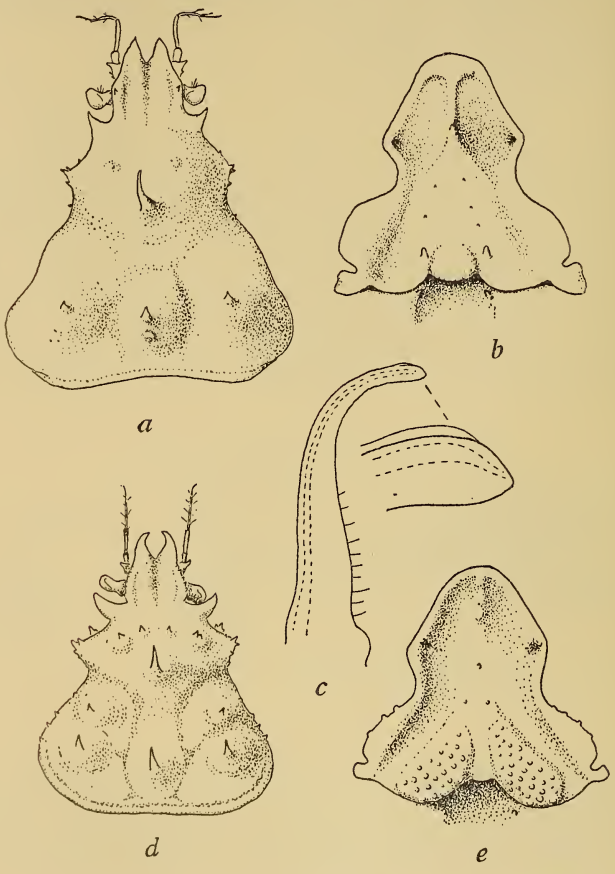


Fig. 5.—*Inachus güntheri* (Miers). *a*, carapace. *b*, sternum ♂ between chelipeds. *c*, 1st pleopod ♂.
Inachus dorsettensis (Penn.). *d*, carapace. *e*, sternum ♂ between chelipeds.

2–3 setules on anterior apex, cornea subglobular. 4th joint of 3rd maxilliped oval, subequal to 3rd joint (excl. internal projection). A minute tubercle on posterior rim of each antennular socket, and usually 2–3 small tubercles on margin between base of ant. 2 and antennal gland. Cheliped in fully grown ♂ with 4th and 6th joints nearly straight and only slightly swollen, finger and thumb shorter than rest of hand, each with one large tooth near base; in younger ♂

4th and 6th joints are more distinctly swollen; 4th joint in ♀ somewhat curved. 2nd leg longer and stronger than 3rd–5th; dactyls of 4th and 5th legs with several minute denticles on inner margin and a stronger one (or two) distally. Sternum in ♂ with smooth-edged flanges at bases of chelipeds, a blunt median tubercle anteriorly, and a pair posteriorly, between the latter a more or less swollen and polished area, hind margin more or less distinctly trilobate, overhanging a rather deep depression in which the apex of the abdomen lies.

Length up to ♂♀ 19 mm., breadth 17 mm.; length of cheliped, ♂ 48 mm., ♀ 24 mm. Pale biscuit colour, eyes pale brown.

Localities.—Cape (Miers); Agulhas Bank, 155 metres (Doflein); Simon's Bay (Lenz and Strunck); St. Sebastian Bay and Cape Barracouda, 72 metres (Odhner); False Bay and Agulhas Bank to Cape Natal (Durban), 10–100 fathoms (S. Afr. Mus.).

Remarks.—It is remarkable that in spite of Miers' figure of the profile of this crab neither Doflein nor Lenz and Strunck recognized the species. No specimens were apparently submitted to Stebbing.

There is considerable variation in the size of ovigerous ♀♀, in the development of the median boss on the trilobate hind margin of ♂ sternum, and the transverse tubercle behind the cardiac spine; the latter itself is sometimes double, *i.e.* there are 2 small tubercles side by side transversely.

As Doflein remarked the species appears to be closely allied to *leptochirus*.

Inachus dorsettensis (Penn.)

Fig. 5, *d*, *e*.

1777. Pennant, Brit. Zool., iv, p. 12, pl. 10, fig. 1.

1853. Bell, Brit. Stalk-eyed Crust., p. 13, fig.

1894. M. Edwards and Bouvier, Res. Sci. Camp. Monaco, vii, p. 6.

1899. *Id.*, *ibid.*, xiii, pp. 45, 46.

1904. Doflein, *l. c.*, p. 72.

? 1911. Rathbun, *l. c.*, p. 248, pl. 20, fig. 4 (*Pseudocollodes complectens*).

1920. Stebbing, Ann. Durban Mus., ii, p. 264, pl. 28, fig. A (*P. complectens*, ? non Rathbun).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 19.

1927. Lebour, J. Mar. Biol. Assoc. Plym., n.s., xiv, p. 802, figs. (larval stages).

Rostral spines curving inwards at tips. Inter-antennular tooth as a rule prominent, curving forwards. Carapace with an erect spine on each of the gastric, cardiac, and branchial regions, a transverse row of 4 tubercles in front of the gastric spine, a tubercle on the anterior branchial region, variable denticles along lateral margins, on hepatic region, and on supra-orbital ridge. 4th joint of 3rd maxilliped slightly shorter than 3rd. In fully grown ♂ 4th and 6th joints of cheliped somewhat swollen. Dactyls of 4th and 5th legs usually with a few scattered denticles, the largest one near the unguis. Sternum in ♂ with obliquely oval granulate swellings overhanging the cavity in which the abdomen lies. 1st pleopod similar to that of *güntheri* but not so strongly curved outwards apically.

Length, ♂♀ 16 mm., breadth 14 mm.; cheliped, ♂ 27 mm.

Localities.—Off Cape St. Blaize, 125 fathoms (Stebbing); Brown's Bank, 36° 40′ S., 21° 26′ E., 80–100 fathoms, and off Cape Natal (Durban), 54–62 fathoms (S. Afr. Mus.).

Distribution.—Eastern Atlantic from Norway to Cape Verde Is.; Mediterranean; Port Alexander, Angola. ? Seychelles.

Remarks.—The validity of the genus *Pseudocollodes* seems doubtful, even if the species *complectens*, the ♂ sternum of which is not described, is not conspecific with *dorsettensis*. Although Stebbing did not recognize the one specimen (♂), which was sent to him, as the European species, I have no hesitation in assigning the South African specimens to *dorsettensis*, whose distribution has already been recorded as far south as 16° S. by Odhner. I have examined Stebbing's specimen and 55 others.

P. complectens is recorded from the Seychelles.

Balss (1929, *l. c.*, p. 4) retains the genus, and adds another species, *demani*, from Japan.

Gen. Platymaia Miers

1904. Doflein, D. Tiefsee Exp., vi, pp. 59, 160, 185, 271.
1910. Stebbing, *l. c.*, p. 286.
1916. Rathbun, Proc. U.S. Nat. Mus., 50, pp. 529 sqq.
1918. *Id.*, Biol. Res. "Endeavour," v, p. 7.

Carapace suborbicular or subtriangular. Rostrum trispinose, the large inter-antennular spine forming the median spine and projecting horizontally forwards. Eye-stalks short, stout, cornea large, subglobular. Basal joint of ant. 2 cylindrical, freely movable. Chelipeds in ♂ elongate. Legs very long and slender, 2nd pair strongly spinose,

6th and 7th joints of 3rd–5th pairs, or 4th and 5th pairs, flattened, more or less oar-like, thickly fringed with setae on front and hind margins. Abdomen of 7 segments in both sexes.

Remarks.—Three species are now recognized from the Indo-Australian and south-east African regions, and three others (Rathbun, 1916) from the Philippines and East Indies.

Platymaia turbynei Stebb.

Fig. 6, *a–c*.

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 3, pl. 5.
1910. *Id.*, *l. c.*, p. 286 (*wyville-thomsoni*, non Miers).
1918. Rathbun, *l. c.*, p. 9.
1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 232.
1923. *Id.*, Fish. Mar. Biol. Surv. Rep. iii, Spec. Rep. 3, p. 1, pl. 10.
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*wyville-thomsoni*, non Miers).

(Not fully adult.) Rostrum with lower median spine much more prominent than the true rostral spines. Carapace distinctly triangular in general shape, hind margin broadly rounded; length slightly greater than breadth, and spines equally well developed in the largest as in the smallest specimens available (*cf.* Stebbing, 1902, pl. 5); inner margin of orbit without any spines; cornea not reaching to the largest spine on hepatic region, which thus can scarcely be described as a post-ocular spine; branchial regions well separated mediodorsally. A blunt denticulate tooth at outer angle of buccal cavity. Basal joint of ant. 2 with 1–2 spines on lower apex, and a variable number along lower margin. Cheliped with palm of hand not longer than finger or thumb in either sex. Fringes of setae on 6th joints of 4th and 5th legs along lower front margin and the upper hind margin; this joint narrow throughout its whole length.

Length (smallest and largest) 15–34 mm., breadth 13–26 mm. Stebbing (1923) had smaller specimens. Pale salmon or orange, legs with broad bands of orange.

Localities.—Off Cape Natal (Durban), 440 fathoms (Stebbing); off Cape Natal, 440 fathoms, and off East London, 400 fathoms (S. Afr. Mus.); off Delagoa Bay (26° 3′ S., 33° 4′ E.), 290 metres (Barnard).

Remarks.—As Miss Rathbun has shown (1918), it is difficult to identify *turbynei* with the East African and Indian Ocean form described by Doflein, who ignored both the size and the morphological peculiarities of Stebbing's species. As regards the structure and

proportions of the walking legs the present specimens correspond with what Doflein called Stage 1, whereas in size they correspond with Stage 4.

No adult of *turbynei* is known, so it is impossible to say whether the chelipeds and legs undergo changes similar to those which have been illustrated by Doflein for the species now known as *alcocki* Rathbun.

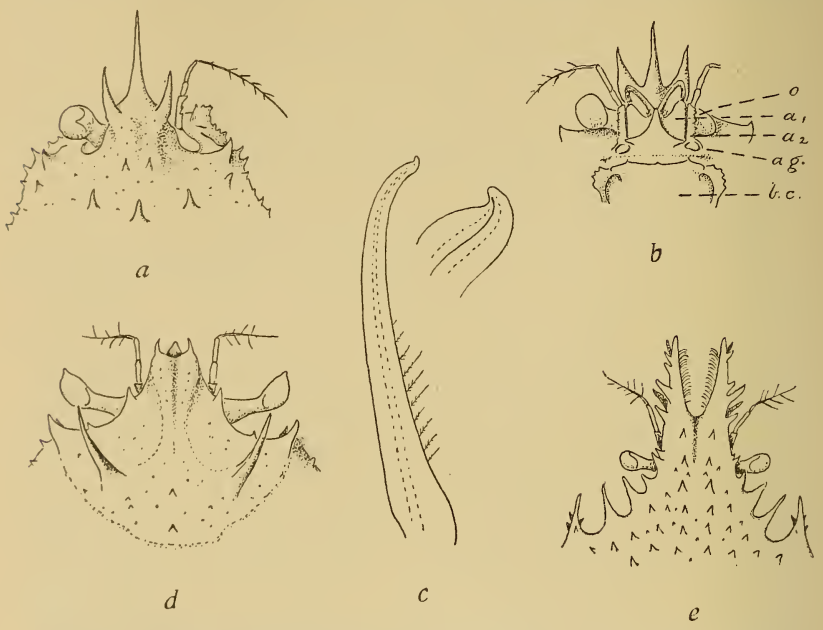


Fig. 6.—*Platymaia turbynei* Stebb. *a*, *b*, dorsal and ventral views of anterior part of carapace. In *a* right eye, in *b* left eye removed to show orbit (*o*); in *b* inter-antennular spine foreshortened in perspective. *c*, 1st pleopod ♂ (not fully adult).
Cyrtomaia murrayi Miers. *d*, dorsal view of anterior part of carapace.
Pleistacantha moseleyi (Miers). *e*, dorsal view of anterior part of carapace.
(*e* nat. size, other figures enlarged.)

In the 1st pleopod ♂ the margins of the seminal channel are separate throughout the whole length of the appendage (fig. 6, *c*).

The Delagoa Bay specimen was compared with the Natal examples at the time, but, being no longer in my hands, is not available for re-examination. (See Addenda.)

Gen. Cyrtomaia Miers

1886. Miers, *Challenger* Rep., xvii, p. 14.
1893. Rathbun, Proc. U.S. Nat. Mus., xvi, p. 228 (publ. July 1893).

1899. Alcock, Deep-sea Brachyura "Investigator," p. 44.
1904. Doflein, D. Tiefsee Exp., vi, pp. 53, 158, 184, 190, 271.
1916. Rathbun, Proc. U.S. Nat. Mus., 50, pp. 532, *sqq.*
1918. *Id.*, Biol. Res. "Endeavour," v, p. 4.
1929. Balss, *l. c.*, p. 3.

Carapace broader than long, very convex. Rostrum bispinose, the inter-antennular spine not greatly exceeding the 2 rostral spines and not projecting horizontally forwards. Two very long spines on gastric region. Eye-stalks not so stout as in *Platymaia*, cornea ovoid, with apical tubercle. Basal joint of ant. 2 cylindrical, not fixed distally to side of rostrum, but scarcely (if at all) movable. Chelipeds in ♂ elongate. Legs very long and slender, 2nd pair spinose, 6th and 7th joints of hinder pairs sometimes fringed with setae. Abdomen of 7 segments in both sexes.

Remarks.—Five or six species from the Indo-Pacific and Australian regions.

Cyrtomaia murrayi Miers

Fig. 6, *d.*

1886. Miers, *l. c.*, p. 15, pl. 3, fig. 1.
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

Carapace with irregularly scattered granules; the 2 long gastric spines slightly divergent, 2 small median spines behind them; the anterior branchial spine larger than the posterior one; cardiac region with 2 prominences each with 2 tubercles, the hinder one slightly the larger; a small median spine on hind margin; lateral margins and hepatic regions with several small spines and tubercles. The largest hepatic spine forms the post-ocular spine; between it and the spine above insertion of eye-stalk is a small denticle lying just outside the orbit. Basal joint of ant. 2 with 2 spines distally and 2 others proximally, 2nd and 3rd joints cylindrical, non-spinose. Eye-stalks rather slender. 4th leg with 6th and 7th joints flattened and fringed with setae (chelipeds and other legs lost).

Length 15 mm., breadth 18 mm.

Locality.—Off coast of Portuguese East Africa (Barnard).

Distribution.—East Indies, 140 fathoms.

Remarks.—Only a single ovigerous ♀ was captured. Although Doflein described a species or subspecies (*platyceros*) from farther up the East coast of Africa, the present specimen agrees with *murrayi* in the spination and fringed 4th leg.

Gen. Pleistacantha Miers

1879. Miers, Proc. Zool. Soc. Lond., p. 24, and J. Linn. Soc. Lond., xiv, p. 646.

1881. M. Edwards, C.R. Ac. Sci. Paris, xciii (*Ergasticus*).

1886. Miers, *Challenger* Rep., xvii, p. 29 (*Ergasticus*) and p. 31 (*Echinoplax*).

1894. M. Edwards and Bouvier, Res. Sci..Camp. Monaco, vii, p. 9 (*Ergasticus*).

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 178 (*Echinoplax*).

1899. *Id.*, Deep-sea Brachyura "Investigator," p. 42 (*Echinoplax*).

1904. Doflein, D. Tiefsee Exp., vi, p. 76.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 80.

Carapace triangular, longer than broad, with very numerous, not very long, spines and tubercles. Rostrum bispinose, with subsidiary spines, the inter-antennular spine simple or bifid, projecting ventrally. Eye-stalks stout, cornea subglobular. Basal joint of ant. 2 cylindrical, not fused distally with side of rostrum, but scarcely if at all movable, not, or only partially, visible in dorsal view. Chelipeds in ♂ longer than in ♀. Legs moderately long, 2nd pair longest, all legs spinose, with spinose and furry dactyls. Abdomen of 7 segments in both sexes.

Remarks.—Atlantic, Mediterranean, and Indo-Pacific.

Pleistacantha moseleyi (Miers)

Fig. 6, *e.*

1886. Miers, *l. c.*, p. 32, pl. 4, figs. 2, 2, *a–c.*

1891. Wood-Mason and Alcock, Ann. Mag. Nat. Hist. (6), vii, p. 259 (*pungens*).

1896 and 1899. Alcock, Illustr. Zool. "Investigator," pl. 17, fig. 1 (♀), and pl. 39 (♂) (*pungens*).

1904. Doflein, *l. c.*, p. 76, pl. 24, figs. 5, 6, pls. 25, 26.

1923. Stebbing, Fish. Mar. Biol. Surv. Rep., iii, Spec. Rep. 3, p. 2.

1933. von Bonde, C., *ibid.*, Rep. 10, pp. 59, 60 (locality records).

Inter-antennular spine bifid. Spines and tubercles on carapace all more or less of same size. Chelipeds and legs more strongly spinose in ♀ than in ♂, though the chelipeds in the latter are more robust.

Length (♀) 133 mm., breadth 84 mm. (Stebbing); another ♀, in S. African Museum, measures 120 × 82 mm. Pale yellow, eggs violet.

Localities.—Off Umvoti River, Natal, 130 fathoms (Stebbing, and S. Afr. Mus.); off Durban, 172–205 fathoms (Fishery Survey).

Distribution.—Philippine Is., 375 fathoms; Andaman Sea, 112–250 fathoms; Nicobars and East coast of Africa, 296–614 metres.

Family ACANTHONYCHIDAE.

1910. Stebbing, *l. c.*, p. 286.

Basal joint of ant. 2 broad, especially at base, apically truncate, and completely fused with epistome. No true orbits. Post-ocular tooth, when present, not hollowed to receive the eye.

Remarks.—A prominent inter-antennular spine is not developed in any of the South African species.

Key to the South African Genera.

I. Rostrum very large, conical, apically notched. No salient supra-orbital spine or post-ocular tooth. Eyes completely sunk (fig. 7, *a*) . . . . . *Xenocarcinus.*

II. Rostrum flanked by salient supra-orbital spines.

A. Walking legs not subchelate, 6th joint cylindrical.

1. Rostrum bifid.

a. A small post-ocular tubercle. Large species . . . . . *Antilibinia.*

b. An outstanding post-ocular projection. Small species . . . . . *Menaethiops.*

2. Rostrum simple. No post-ocular tubercle.

a. Rostrum laterally compressed. Supra-orbital spine small. Eyes scarcely reaching margin of carapace. Carapace ♀ with lateral foliaceous lobes . *Huenia.*

b. Rostrum dorso-ventrally depressed. Supra-orbital tooth large. Eyes short, but reaching beyond margin of carapace. Carapace ♀ without foliaceous lobes. *Menaethius.*

B. Walking legs subchelate, 6th joint with a setiferous projection on inner margin against which the dactyl impinges (fig. 10, *d*) . . . . *Dehaanius.*

Note.—*Epialtus vetchi* Stebb. 1920 is an *Elamena* (*Hymenosomatidae*). *E. scutellatus* (Miers 1886 and Stebbing 1910) is a *Dehaanius.*

Gen. Xenocarcinus White

1847. White in Jukes' Voyage H.M.S. *Fly*, ii, p. 335.

1865. M. Edwards, Ann. Soc. Entom. Fr. (4), v, p. 144 (*Huenioides*).

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 191.

1934. Gordon, Res. Sci. Ind. Néerland, iii, fasc. 15, p. 69.

1938. Balss, Medd. Göteb. Mus., lxxv, p. 20.

Carapace narrow, elongate. Rostrum stout, conical, apically notched. Eyes completely sunk in carapace. No supra- or post-ocular spines. Ant. 2 completely hidden beneath rostrum. Chelipeds not much shorter or stouter than 2nd legs; 4th and 5th legs short; dactyls of 2nd–5th legs serrate on inner margins. Abdomen in ♀ of 5 segments, the 4th–6th being fused.

Xenocarcinus tuberculatus White

Fig. 7, *a*, *b*.

1879. Miers, J. Linn. Soc. Lond., xiv, p. 648, pl. 12, fig. 5 (rostrum).

? 1895. Alcock, *l. c.*, p. 192.

? 1898. *Id.*, Illustr. Zool. "Investigator," pl. 33, figs. 3, 3, *a*.

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 248.

1934. Gordon, *l. c.*, pp. 69, 70, 72, fig. 37, *b*, *c*.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 109, fig. 21, C, D (plp. 1, 2, ♂).

Carapace with more or less strongly raised tubercles, typically in transverse rows. 4th joint of 2nd–5th legs smooth; dactyls with a single row of serrations.

Length (ovig. ♀) 23 mm., breadth 9 mm. Alcock's specimens were reddish, with a yellow median stripe from rostrum to abdomen, and a wavy yellow line on each side.

Localities.—Aliwal Shoal, Natal, 25 fathoms, and off Pondoland coast, 30 fathoms (S. Afr. Mus.).

Distribution.—Hong Kong. ? Ceylon, Andamans, Cargados Carajos, Chagos Archipelago.

Remarks.—Dr. Gordon points out that Alcock's specimens according to his description and figure, had nodular chelipeds and legs; in the type, and also in the South African specimens, they are quite smooth. I have seen no ♂.

Gen. Antilibinia McLeay

? 1878. M. Edwards, Crust. Règne Mexico, p. 138 (*Taliepus*).

1910. Stebbing, *l. c.*, p. 287.

1916. Rathbun, Proc. U.S. Nat. Mus., 50, p. 537.

1918. *Id.*, Biol. Res. "Endeavour," v, p. 13.

? 1925. *Id.*, Bull. U.S. Nat. Mus., no. 129, p. 162 (*Taliepus*).

Large species. Carapace subcircular, dorsally smooth but more or less uneven in adult, in young with tubercles; hepatic and branchial spines near margin; glabrous in adult but covered with short thick pile in young. Rostrum short, bifid. A supra-orbital spine, and a small post-ocular tubercle which is not hollowed. Eye-stalk short, but visible in dorsal view. Movable joints of ant. 2 visible dorsally. Chelipeds stouter and usually longer than 2nd leg, especially in ♂, apices of finger and thumb slightly spooned. 2nd–5th legs strong,

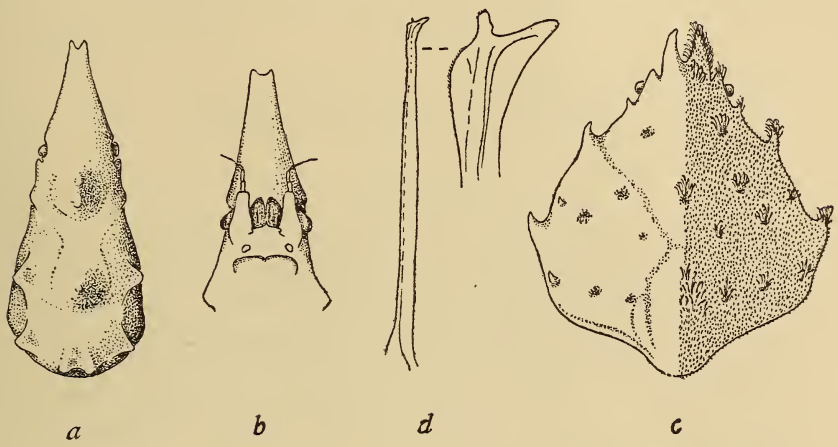


Fig. 7.—*Xenocarcinus tuberculatus* White. *a*, dorsal view of carapace. *b*, ventral view of rostral area. *Antilibinia smithii* McLeay. *c*, dorsal view of carapace of juv. 23 mm. in length, left side cleaned. *d*, 1st pleopod ♂.

dactyls with a double row of serrations on inner margin, and with strong curved unguis. Abdomen (*fide* Krauss) with 7 segments in both sexes.

Remarks.—The deep-water S. Australian species *lappacea* Rathbun 1918, with carapace distinctly longer than broad, and rather long rostral horns, does not seem to me to fit well into this genus, especially as the ♀ has the abdomen with 6 segments instead of 7, although I have not been able to check Krauss' statement in regard to the ♀ of the South African species.

On the other hand, there is such an obvious affinity between the Californian *Taliepus* and *Antilibinia* that I would sink the former as a synonym. Rathbun's figures (1925, *l. c.*, pls. 54, 55) of *T. dentatus* might almost be taken from a specimen of *A. smithii*, except for the smaller supra-orbital spine and the position of the tubercle behind

eye; even the peculiar sculpturing of the under surface of hand of cheliped is the same in the two species.

Taliepus was proposed as a subgenus of *Epialtus*, and *Antilibinia* was also regarded as such by Miers (1879, p. 650), who included *dentatus* in the latter subgenus.

Antilibinia smithii McLeay

Smith's Spider-crab.

Fig. 7, *c*, *d*.

1838. McLeay, Annulosa S. Afr., p. 57, pl. 2.
1843. Krauss, Südafr. Crust., p. 49, pl. 3, fig. 4, *a–c*.
1910. Stebbing, *l. c.*, p. 287.
1918. *Id.*, Ann. Durban Mus., ii, p. 49.

Carapace with setiferous tubercles in young, but smooth in adult. Hepatic spine acute, curving forwards and inwards, 2 branchial knobs, acute in young, becoming quite blunt in adult. In large specimens middle branchial region more or less coarsely pitted, an oval rugose or pitted area on hinder branchial region each side of intestinal region. Chelipeds in ♂ robust. No tooth on inner margin of 6th joint of legs. The double row of serrations on the dactyls becomes obsolete in large specimens. Sternum and abdomen, legs and 4th and 5th joints of chelipeds sparsely punctate (large ♂).

Length up to (♂) 72 mm., breadth 67 mm. Various shades of brown, reddish, or greenish, more or less mottled, or with small black spots, chelipeds and legs with fine striae (*cf.* McLeay's figure).

Localities.—Natal (McLeay, Krauss, Stebbing); Winkle Spruit, Port Shepstone, Durban, East London (S. Afr. Mus.).

Remarks.—This crab lives in rocky habitats, exposed to the breakers; unlike most Spider-crabs it is remarkably free from growths of seaweeds, Hydroids, etc., especially when adult. It is the largest of the South African littoral and shallow-water Spider-crabs.

I have seen no ♀. Juveniles are easily distinguished from *Dehaanius dentatus* by the shape of the 6th joint of the legs.

Gen. Menaethiops Alcock

1895. Alcock, *l. c.*, p. 289.
1906. Nobili, Bull. Sci. Fr. Belg., xc, p. 106 (*Parahoplophrys*).
1929. Balss, *l. c.*, p. 8.

Carapace ovate-triangular, more or less constricted in front of hepatic region. Rostrum bifid. No post-ocular spine (Alcock); post-ocular spine fused with the posteriorly expanded supra-orbital ridge (Balss). Basal joint of ant. 2 expanded. Chelipeds not strongly enlarged. Abdomen with 7 segments in both sexes.

Remarks.—Balss recognizes 5 species from the Western Indian Ocean, including *fascicularis* after examination of Krauss' type specimens.

Stephensen (1945, Dan. Sci. Invest. Iran, pt. 4, p. 99, fig. 18, D) figures the plp. 1♂ of *M. nodulosa* (Nob.) which is similar to that of *fascicularis*.

Menaethiops fascicularis (Krauss)

Fig. 8.

1843. Krauss, Südafr. Crust., p. 50, pl. 3, fig. 5, *a–d* (*Pisa f.*).
1886. Miers, *Challenger* Rep., xvii, p. 56 (*Hyastenus*?).
1910. Stebbing, *l. c.*, p. 288 (*Pisa f.*, sed incert. sedis).
1918. *Id.*, Ann. Durban Mus., ii, p. 50 (*Hyastenus f.*).
1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 454 (*Blastus f.*).
1929. Balss, *l. c.*, p. 9, fig. 3.

Carapace with regions well defined, covered with close short pile, and numerous tufts of hooked setae. Rostral prongs rather short and stout, porrect. Inter-antennular tooth inconspicuous. Supra-orbital ridge not very prominent, rounded or feebly angulate anteriorly, and posteriorly continued into the post-ocular tooth without any slit; post-ocular tooth flattened dorso-ventrally, denticulate, not hollowed. A small tubercle on hepatic region (easily overlooked), 2–3 flattened denticles on subhepatic region, and a row of denticles from outer angle of buccal cavity across pterygostomial region. Outer apex of the broad basal joint of ant. 2 strongly produced, visible in dorsal view; a small denticle at inner (ventral) apex, and another just external to opening of antennal gland; whole outer margin minutely serrulate. Eye-stalk well developed, for most part visible in dorsal view. Cheliped in ♂ short, 3–4 rows of tubercles on 4th and 5th joints, hand somewhat inflated, smooth and glabrous, finger and thumb gaping at base. 2nd leg not much longer than others; dactyls (incl. that of 2nd leg) with a row of rather prominent denticles on inner margin. Sternum of ♂ evenly convex, without hollows at bases of legs. Abdomen of ♂ with 6th segment wider than 5th.

Length 9 mm., breadth 7 mm. Drab with numerous red dots on carapace when cleaned, finger and thumb of chelipeds blotched or banded with bright crimson.

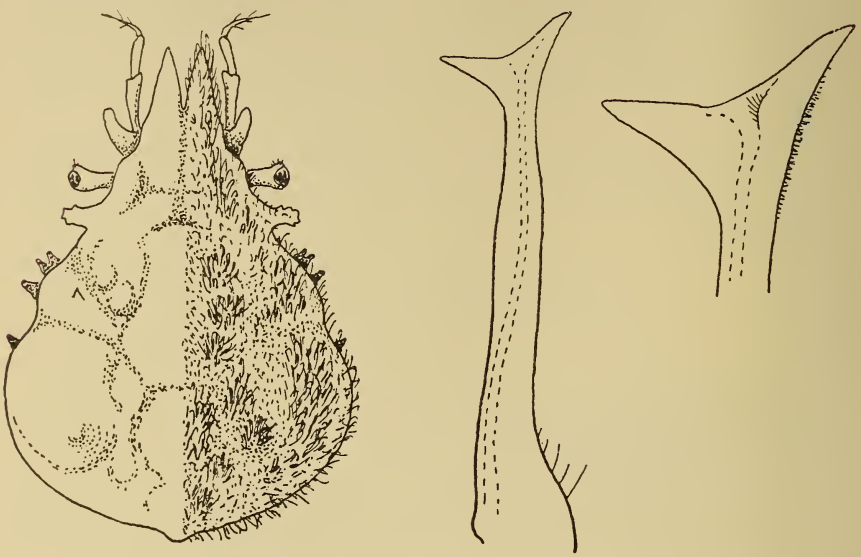


Fig. 8.—*Menaelthiops fascicularis* (Krauss). Carapace, partly cleaned, and 1st pleopod ♂.

Localities.—Natal (Krauss); Durban (Stebbing, and S. Afr. Mus.); Umhlali, Umtwalumi, and Impengazi (Natal and Zululand) (coll. T. A. Stephenson).

Distribution.—Mauritius (Richters).

Remarks.—Miers noticed that Krauss' figure shows the orbit entire above, which is correct, but which excludes the species from the genus *Hyastenus*.

Gen. Huenia de Haan

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 194 (references).

Carapace depressed, elongate triangular in ♂, with large lateral branchial lobe, with or without lateral hepatic teeth; subquadrangular in ♀ with large foliaceous hepatic and branchial lobes. Supra-orbital spine present, post-ocular tooth absent. Rostrum simple, more or less acute, laterally compressed. Eyes very small, almost immovable. Chelipeds moderately developed in ♂. 2nd leg rather long, especially in ♂, the others short, 6th joint with tuft of setae on a slight projection

near end of inner margin, best developed on 2nd leg; dactyls short, stout, not much curved, inner margin doubly serrate. Abdomen with 7 segments in ♂, 5 in ♀ (4th–6th segments fused).

Huenia proteus de Haan

Fig. 9, *a–f*.

1865. Milne Edwards, Ann. Soc. Entom. Fr. (4), v, p. 143, pl. 4, fig. 2 (*grandidieri*).

1884. Miers, Crust. H.M.S. *Alert*, pp. 191 and 520 (*pacifica*).

1893. Stebbing, Hist. Crust., p. 107, figs. 5–7.

1894. Ortmann, Semon's Austral. Reise, v, p. 39 (*grandidieri* kept separate from *proteus*).

1895. Alcock, *l. c.*, p. 195.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 662.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 342, pl. 47, figs. 2, 2, *a–c* (*grandidieri*).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 249.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 57.

1917. *Id.*, Ann. Durban Mus., i, p. 435.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

1927. Hale, Crust. S. Austral., pt. 1, p. 133, fig. 132.

Carapace very variable in shape, but depressed, with 2 low prominences in middle line. Rostrum short or rather long. Finger and thumb of cheliped in adult ♂ gaping at base, in ♀ and young ♂ with their opposed margins meeting for nearly whole length.

Length up to 30 mm.

Localities.—Durban (Stebbing); Delagoa Bay (Barnard).

Distribution.—East coast of Africa, Indo-Pacific to Australia, China, Japan, Fiji Is. 0–80 fathoms.

Remarks.—The ♀ is mostly found on the calcareous Green Alga *Halimeda*, the segments of which it resembles in shape; the ♂ apparently roams about more freely. *Halimeda* is recorded as far south as Algoa Bay.

The closely allied *Trigonothir* (=*Simocarcinus*) *pyramidatus* occurs at Mauritius (*cf.* Balss, Medd. Göteb. Mus., lxxv, p. 18, 1938).

Gen. Menaethius M. Edw.

1834. Milne Edwards, Hist. Nat. Crust., i, p. 338.

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 197.

Carapace triangular or pyriform, ♀ without foliaceous lateral lobes, surface tuberculate. Supra-orbital tooth strong, horizontal, laminar; post-ocular tooth absent. Rostrum simple, acute, dorso-ventrally depressed. Eyes short, but projecting slightly beyond margin of

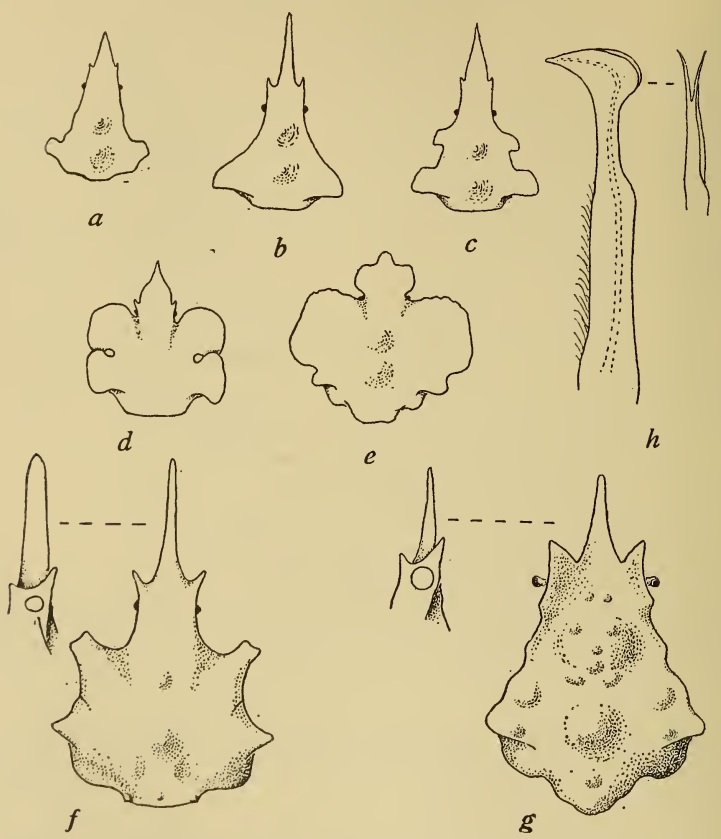


Fig. 9.—*Huenia proteus* de Haan. *a–c*, outlines of ♂. *d*, *e*, outlines of ♀. *f*, carapace of ♀ from Delagoa Bay, with side view of rostrum. *Menaethius monoceros* (Latr.). *g*, carapace, with side view of rostrum. *h*, 1st pleopod (right) ♂, with internal view of apex. (*a*, *c*, *d*, after Stebbing, 1893. *b*, *e*, after Borradaile, 1903. *a* is a juvenile.)

carapace. Chelipeds in ♂ well developed, finger and thumb gaping at base. Legs short, 2nd longest, 6th joint cylindrical, with tuft of setae on inner margin, dactyls not strongly curved, with double row of serrations on inner margin. Abdomen in ♂ with 7, in ♀ with 5, segments.

Menaethius monoceros (Latr.)

Fig. 9, *g*, *h*.

1830. Rüppell, Krab. Roth. Meer., p. 24, pl. 5, fig. 4, pl. 6, fig. 19 (*Inachus arabicus*).

1875. Paulson, Red Sea Crust., p. 6, pl. 2, figs. 2, 3, *a*, *b*, 4 (and var. *subserratus*).

1894. Ortmann, Semon's Austral. Reise, v, p. 39.

1895. Alcock, *l. c.*, p. 197 (references).

1902. de Man, Abh. Senckenb. Ges., xxv, p. 662.

1904. Doflein, D. Tiefsee Exp., vi, p. 78.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 343.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 25, pl. 3, fig. 6 (*subserratus* and *dentatus*), p. 26 (*depressus*).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 249.

1931. Chopra, Rec. Ind. Mus., xxxiii, p. 324.

1942. Ward, Mauritius Inst. Bull., ii, p. 72.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 105, fig. 20, A (plp. 1 ♂).

The rather strongly tuberculate carapace and the strong laminate supra-orbital teeth distinguish this crab from triangular-shaped examples of *H. proteus*. The lateral projections are often stronger and more dentiform than in the specimen here figured, which corresponds with Ruppell's figure.

Length up to 26 mm.

Localities.—Mozambique Island (K.H.B. coll. 1912); Zululand coast (S. Afr. Mus.); Delagoa Bay (van der Horst coll., also Lourenzo Marques Mus.).

Distribution.—Red Sea, East coast of Africa, Mauritius, Indo-Pacific to Australia, China, Fiji, Sandwich Is.

Gen. Dehaanius McLeay

1910. Stebbing, *l. c.*, p. 287.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 99 (*Acanthonyx*) (key to Indo-Pacific species).

Carapace more or less quadrangular or shield-shaped, the lateral hepatic tooth, and the branchial tooth when present, horizontal, laminar, more or less produced; surface smooth or the regions feebly marked. Rostrum bifid. Supra-orbital tooth well developed; post-

ocular tooth present or absent. Chelipeds larger in ♂ than in ♀. Legs short, robust, subchelate, the 6th joint having a setiferous projection on inner margin against which the dactyl impinges, inner margin of dactyls with double row of serrations. Abdomen with 7 segments in ♂, 5 in ♀, 4th–6th segments fused, the sutures obsolete or indistinct.

Remarks.—Apparently the only difference between this genus and *Acanthonyx* is the 7 segmented ♂ abdomen. The genotype of *Acanthonyx* (A. *lunulatus*) has a 6-segmented ♂ abdomen and no post-ocular tooth. The latter character obviously has little generic value. Ortmann saw no reason for maintaining *Dehaanius*, and Stephensen inclines to the same opinion.

Key to the South African Species.

1. Post-ocular tooth present.
   - *a.* Carapace subtriangular, (antero-) lateral margins diverging posteriorly.
     - i. Two large triangular (hepatic and branchial) lateral teeth . . . . . *dentatus.*
     - ii. Three subequal teeth behind the hepatic tooth . 4-*dentatus.*
   - *b.* Carapace shield-shaped, sides nearly parallel . . *undulatus.*
2. Post-ocular tooth absent. Carapace shield-shaped, sides nearly parallel . . . . . *scutellatus.*

Dehaanius dentatus (M. Edw.)

Fig. 10, *a*, *b*.

1838. McLeay, Annulosa S. Afr., pp. 57 and 58, pl. 3, figs. *a–c* (*acanthopus*).

? 1862. Milne Edwards, F. carc. Réunion, p. 7, pl. 17, fig. 3 (*consobrinus*).

1875. Paulson, Red Sea Crust., p. 7, pl. 3, fig. 1 (*consobrinus*, ? non M. Edwards).

1894. Ortmann, Semon's Austral. Reise, v, p. 39.

? 1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 199 (*consobrinus*) (quotes Heller).

1910. Stebbing, *l. c.*, p. 287 (references).

1914. Lenz and Strunck, D. Südpol Exp., xv, p. 277.

1920. Stebbing, Ann. Durban Mus., ii, p. 264, pl. 28, fig. B (*Pugetia quadridens*, non de Haan).

1923. Odhner, Med. Göteb. Mus., xxxi, p. 26.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 362.

Rostral prongs rather long and usually rather slender. Carapace with regions fairly well defined in most specimens, with several small setiferous tubercles in young (Stebbing, 1920, fig.), which mostly become obsolete in adult, but 2 on anterior gastric region usually

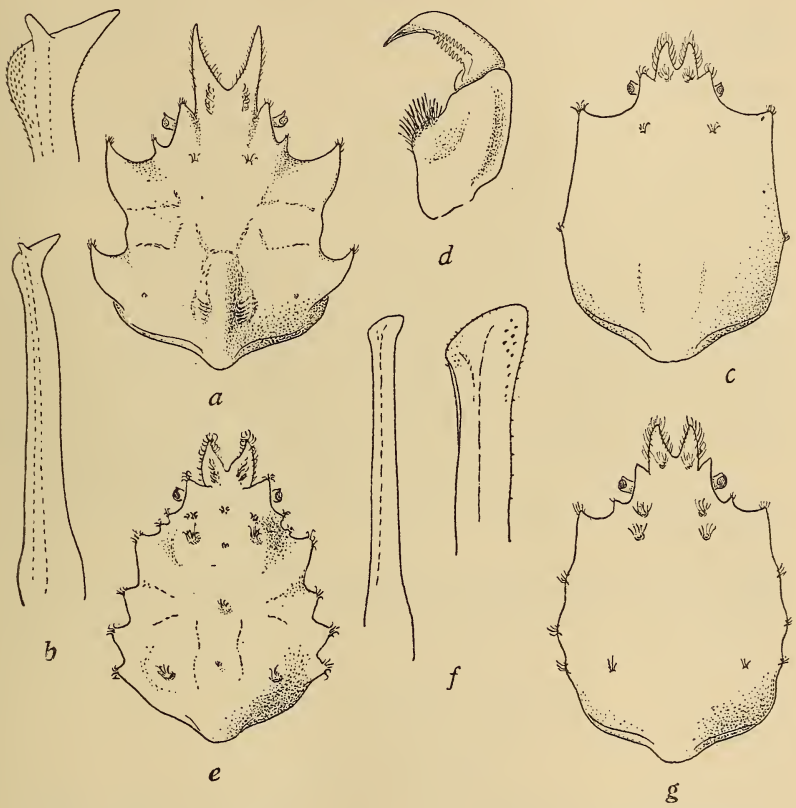


Fig. 10.—*Dehaanius dentatus* (M. Edw.). *a*, carapace. *b*, 1st pleopod ♂, apex further enlarged (*scutellatus* and *undulatus* are similar).
Dehaanius scutellatus (McLeay). *c*, carapace. *d*, lower surface of 6th joint and dactyl of leg, dactyl drawn somewhat obliquely to show double serration.
Dehaanius 4-dentatus (Krauss). *e*, carapace. *f*, 1st pleopod ♂, apex further enlarged.
Dehaanius undulatus Brnrd. *g*, carapace.

present; lateral hepatic and branchial teeth large, acute, with sometimes a small blunt projection or a sharp denticle between them. Post-ocular tooth present. Outer apex of basal joint of ant. 2 acute, shortly spiniform. Eye-stalk with small tubercle on anterior apex. Carapace, sternum, abdomen, chelipeds, and legs covered with short

close pile, the lateral points of carapace and the tubercles with hooked setae.

Length up to 25 mm., breadth 20 mm., ♀ slightly smaller. Smallest specimen examined 6 mm. Various shades of brown, olive, russet, red, or maroon, often mottled with white, legs often banded; or cream with red markings; according to the colour of the surrounding habitat.

Localities.—False Bay (Stimpson, Miers, Stebbing, Lenz and Strunck); Walker Bay, 43 metres (Odhner); Algoa Bay (Ortmann, Stebbing); Natal (Krauss); off Tugela R., Natal (Stebbing); False Bay to East London and Natal, 0–22 fathoms (S. Afr. Mus.); off Cape Point, 145 fathoms (S. Afr. Mus. label *sic*, obviously an error).

Distribution (of *consobrinus*).—Red Sea; Réunion; Madras.

Remarks.—Both Paulson and Stebbing regarded the Red Sea specimens as synonymous with *4-dentatus*. Paulson's figure, however, seems obviously to represent a specimen of *dentatus*. I have not seen Milne Edwards' figure of *consobrinus* from Réunion. Heller's description will not fit (*e.g.* no post-ocular tooth). The true *4-dentatus*, however, is quite distinct not only in the carapace characters, but also in the 1st pleopod ♂. In regard to this last character *dentatus*, *scutellatus*, and *undulatus* are more closely allied to each other than to *4-dentatus*.

I have seen the specimen identified by Stebbing as *Pugetia quadridens*; it is merely a young *D. dentatus*.

Dehaanius 4-dentatus (Krauss)

Fig. 10, *e*, *f*.

1843. Krauss, Südafrik. Crust., p. 49, pl. 3, fig. 7, *a–c* (name written as above).

1894. Ortmann, Semon's Austral. Reise, v, p. 39.

1910. Stebbing, *l. c.*, p. 288 (references, excluding Paulson's *consobrinus*).

1918. *Id.*, Ann. Durban Mus., ii, p. 49.

Rostral prongs rather short and stout. Carapace smooth, subtriangular, hepatic tooth moderately well developed, behind which 3 subequal triangular teeth, all setiferous. Post-ocular tooth present, and a small denticle between it and the hepatic tooth. Two tubercles at base of rostrum, 4 on gastric region (sometimes only 2), 2 on

posterior branchial region and 4 medio-dorsal, all bearing hooked setae. Other characters, except 1st pleopod ♂ (fig. 10*f*), as in *dentatus*.

Length up to 23 mm., breadth 10 mm. Yellowish brown.

Localities.—Natal (Krauss); Isipingo, Natal (Stebbing); East London, Durban, Delagoa Bay (S. Afr. Mus.).

Distribution.—Dar-es-Salaam (Ortmann); Mauritius (S. Afr. Mus.).

Remarks.—With the exception of Ortmann's and Stebbing's records, this species does not seem to have been reported since Krauss' time.

Dehaanius undulatus Brnrd.

Fig. 10, *b*, *g*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 361.

Rostral prongs rather short and stout. Carapace smooth, shield-shaped, hepatic tooth moderately well developed, behind which the lateral margin is undulate with 3 blunt and feeble, setiferous denticles. Post-ocular tooth present. Two tubercles at base of rostrum, 4 on gastric region and 2 on posterior branchial regions, all setiferous. Other characters as in *dentatus*.

Length up to 17 mm., breadth 11–12 mm.

Localities.—Durban (S. Afr. Mus.); Delagoa Bay (K.H.B. coll. 1912).

Remarks.—Resembles *Acanthonyx lunulatus* (Risso) (see Monod, 1933, Bull. Com. Et. sci. Afr. occid. Franç., xv, fig. 7, D) in general shape, but has 3 tubercles on lateral margin and a post-ocular tooth.

Dehaanius scutellatus (McLeay)

Fig. 10, *b*, *c*, *d*.

1838. McLeay, Annulosa S. Afr., p. 57 (*Acanthonyx s.*).
1843. Krauss, Südafr. Crust., p. 47, pl. 3, fig. 6, *a–c* (*A. macleaii*).
1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 199 (*A. macleayi*).
1910. Stebbing, *l. c.*, p. 288 (*macleaii*).
1910. *Id.*, *ibid.*, p. 288 (*Epialtus scutellatus*).
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*macleaii*).
1947. *Id.*, Ann. Mag. Nat. Hist. (xi), 13, p. 362.

Rostral prongs rather short and stout. Carapace smooth, shield-shaped, nearly parallel-sided; hepatic tooth well developed, behind which lateral margin is nearly straight with a feeble setiferous tubercle. Post-ocular tooth absent. Two setiferous tubercles at base of rostrum

and 2 feeble ones on gastric region. Outer apex of basal joint of ant. 2 blunt. Other characters as in *dentatus*.

Length up to (♀) 21 mm., breadth 15 mm.

Localities.—Natal (Krauss); Isipingo, Port Shepstone, Durban, and Delagoa Bay (S. Afr. Mus.).

Distribution.—Karachi (Alcock); Mauritius (S. Afr. Mus.).

Remarks.—McLeay stated that a tooth was present at the "external angle of orbit." If the specimen is viewed from the side, the anterior angle of orbit might be regarded as external. Krauss evidently assumed that the posterior angle of the orbit as seen in dorsal view was the "external" angle and consequently instituted a new species for his specimens, although he fully recognized the close similarity between them and McLeay's description. That both authors are referring to one and the same species is confirmed by the photograph of McLeay's type specimen in the Sydney Museum, for which I have to thank Mr. Melbourne Ward.

Family BLASTIDAE.

1910. Stebbing, *l. c.*, p. 288.

The basal joint of ant. 2 is broad as in *Acanthonychidae* but the orbits are more completely developed, the post-ocular tooth being always present, and hollowed for reception of the cornea.

Key to the South African Genera.

1. Rostrum shortly triangular with apical slit . . . *Doclea.*
2. Rostrum with 2 long spines, separate from base, and more or less divergent apically.
   - *a.* Supra-orbital ridge well separated from the post-ocular tooth.
     - i. Carapace (in the S. African species) with flat-topped tubercles. Rostral spines simple (fig. 11, *b*) . . . . . *Scyramathia.*
     - ii. Carapace without flat-topped tubercles. Rostral spines with accessory spine on inner margin towards apex (fig. 11, *d*, e) . . . *Naxioides.*
   - *b.* Supra-orbital ridge closely approximate to post-ocular tooth, separated by a narrow, more or less closed, keyhole shaped slit.
     - i. Carapace with a few slender spines. Chelipeds and legs not strongly tuberculate . . *Hyastenus.*
     - ii. Carapace, chelipeds, and legs strongly tuberculate, tubercles on carapace mostly flat-topped . *Eurynome.*

Gen. Doclea Leach

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 225.

1918. Rathbun, Biol. Res. "Endeavour," v, p. 16.

1929. Balss, *l. c.*, p. 14.

1935. Chopra, Rec. Ind. Mus., xxxvii, pp. 467 *sqq.*, fig. 1 (♂ pleopods of 4 species).

Carapace subcircular, with lateral and often also dorsal spines. Rostrum shortly triangular, apically notched or bifid. No supra-orbital tooth. Post-ocular tooth hollowed, separated from supra-orbital ridge by a narrow slit. Eyes small. Antenna 1 short; basal joint of ant. 2 produced in a sharp tooth at outer apex; flagella of both antennae much reduced. Chelipeds larger in ♂ than in ♀. Dactyls of walking legs long, especially in 2nd leg, smooth. Abdomen with 7 segments in ♂, 7 or 4 in ♀.

Doclea muricata (Herbst)

Fig. 11, *a*.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 232.

A medio-dorsal line of tubercles or short spines from base of rostrum to hind margin of carapace, the spine on the hind margin being the largest; antero-lateral margin with 4 spines; 2 spines, one behind the other, on branchial region, and some small tubercles between branchial and gastric regions. A denticulate flat tooth at angle of buccal cavity. Pterygostomial region not longitudinally channelled (external to 3rd maxilliped). Abdomen of ♀ with 4 segments (3rd–6th segments fused). Carapace, chelipeds, and legs (except hands of chelipeds and dactyls of legs) covered with very close short velvety pile.

Length 38 mm., breadth (excl. spines) 29 mm.

Locality.—Off Port Shepstone, Natal, 34 fathoms (Stebbing); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Indo-Pacific.

Gen. Scyramathia M. Edw.

1910. Stebbing, *l. c.*, p. 289.

Carapace triangular or pyriform, with spines and tubercles, the lateral hepatic and branchial ones being prominent. Rostrum of 2 long, slender simple spines, separated at their bases and usually

divergent. Supra-orbital tooth or spine present. Post-ocular tooth usually not much hollowed, separated by a distinct gap from supra-orbital ridge. Eyes small. Chelipeds in adult ♂ considerably elongated; 2nd leg markedly longer than the others. Abdomen with 7 segments in both sexes.

Remarks.—Deep and moderately deep water in the Atlantic and Indian Oceans.

Scyramathia hertwigi Doflein

Fig. 11, *b*, *c*.

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 7, pl. 6.

1910. *Id.*, *l. c.*, p. 289.

Rostral spines $\frac{1}{2}$ (very young, 8 mm. carapace length), $\frac{2}{5}$ or $\frac{1}{3}$ (juv. 15 mm.) to $\frac{1}{4}$ or $\frac{1}{5}$ (adult) length of rest of carapace, subparallel or feebly diverging. Lateral hepatic and branchial spines conical and acute in juv., becoming blunted and flattened in adult, the hepatic spine flattened on outer side, the branchial on hinder side; median anterior gastric spine and spine on hind margin of carapace remain more or less acute throughout life; the tubercles on postero-gastric, branchial and cardiac regions are flat-topped in young (12 mm. length) except the one on branchial region flanking the cardiac tubercle; in smallest specimen examined (8 mm.) the tubercles are bluntly conical and the lateral hepatic and branchial spines very slender; the externally flattened post-ocular tooth joined to the hepatic tooth by a blunt ridge in juv., by a keeled ridge in adult. Cheliped in ♂, 4th and 5th joints with 2 denticulate keels dorsally, and one ventrally on 4th joint, 6th joint with keeled upper edge; hand, finger, and thumb minutely and closely granulate; in ♀ all ridges much less developed and without denticles on 4th and 5th joints. 2nd–5th legs smooth, lower margin of dactyls of 3rd–5th legs with a row of minute spaced denticles (at all ages). Whole body, chelipeds (except finger and thumb), and legs (except ungues) closely covered with vesicular setae, mixed with ordinary setules on the dactyls; longer hooked setae on rostral prongs, on 2 patches on gastric region, and on sides below the hepatic and branchial spines. Eggs small and very numerous.

Length up to ♂ 63 mm., ♀ 43 mm., breadth (at level of, but excl. lateral branchial spines) ♂ 40 mm., ♀ 25 mm., cheliped, ♂ 160 mm., ♀ 42 mm. Buff or pale greyish.

Localities.—Off Cape Peninsula, 140 fathoms (Stebbing); off Cape

Point and on Agulhas Bank as far east as 23° E., 318–500 metres (Doflein); off Table Bay, Cape Peninsula and Cape Point, as far south as 36° 40′ S., 21° 26′ E., 140–230 fathoms (S. Afr. Mus.).

Remarks.—Very close to and possibly only a subspecies of *carpenteri* (Norman) which occurs in the N. Atlantic from the Shetlands to the

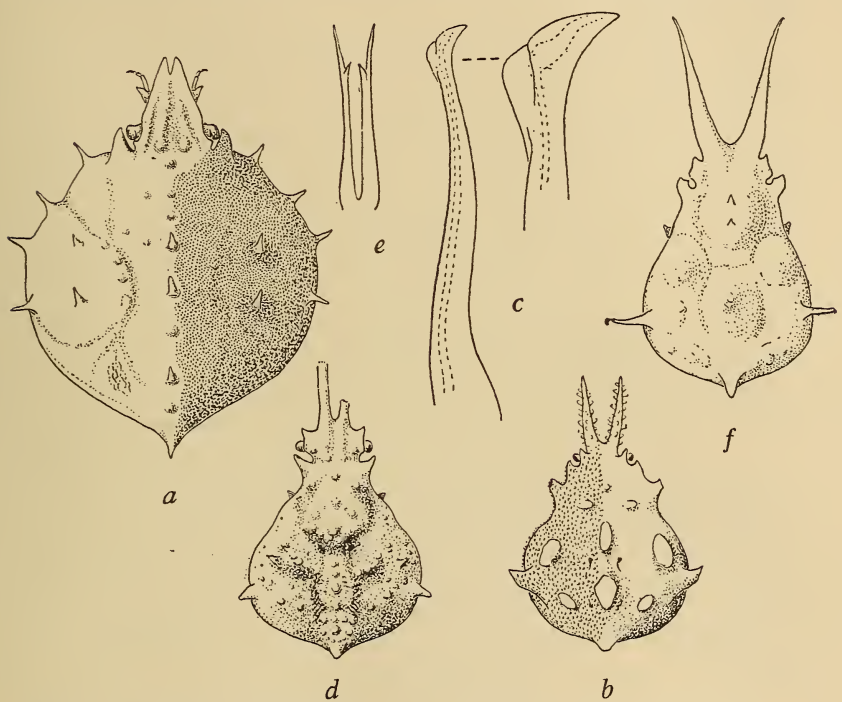


Fig. 11.—*Doclea muricata* (Herbst). *a*, carapace, pile cleaned off left side. *Scyramathia hertwigi* Doflein. *b*, carapace, partly cleaned. *c*, 1st pleopod ♂. *Naxioides hirta* M. Edw. *d*, carapace, rostral prongs broken (copy from Hilgendorf, 1878). *e*, rostral prongs of *N. robillardi* Miers to show accessory spinules (copy from Miers, 1882). *Hyastenus spinosus* M. Edw. *f*, carapace, cleaned.

Azores. *S. hertwigi* is distinguished by its shorter and less divergent rostral spines; in this respect the young are nearer to *carpenteri* than the adults (*cf.* figure in M. Edwards and Bouvier, 1899, Res. Sci. Camp. Monaco, xiii, pl. 1, fig. 4).

Common on the Stock-fish grounds north-west of Table Bay. Most examples are covered with Hydroids, Tunicates, or Sponges, sometimes nearly completely enveloped in a sponge.

The Bopyrid parasite *Scyracepon levis* Brnrd. 1940 is found in the branchial cavity.

Gen. Naxioides M. Edw.

1865. Milne Edwards, Ann. Soc. entom. Fr. (4), v, p. 142.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 784 (*Podopisa*).

1894. Ortmann, Semon's Austral. Reise, v, p. 42 (*Naxia*, part, key to species).

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 216 (*Naxia*, part).

1929. Balss, *l. c.*, p. 14.

Carapace pyriform. Rostral spines subparallel or divergent, with a small accessory spine on inner (upper) margin near apex. Supra-orbital ridge prominent, anteriorly more or less spiniformly produced. Post-ocular tooth unequally bi- or tri-lobed. Cheliped larger in ♂ than in ♀; legs smooth and rather slender, 2nd leg longer than others. Abdomen in ♂ with 7 segments, in ♀ with some of the segments coalesced.

Remarks.—Distinguished from *Hyastenus* by the accessory spinules on the rostral spines.

Ortmann and Alcock place *Naxioides* as a synonym of *Naxia*.

Key to the South African [Mauritian] Species.

1. Carapace with comparatively few and rather blunt tubercles.
   a. No spine at end of 4th joint of 2nd–5th legs . . *hirta.*
   b. A spine at end of 4th joint of 2nd leg, and a knob on end of 4th joint of 3rd leg . . . . [*spinigera*].
2. Carapace with numerous sharp spines. A spine at end of 4th joint of 2nd–5th legs . . . . . [*robillardi*].

Naxioides hirta M. Edw.

Fig. 11, *d*.

1865. Milne Edwards, *l. c.*, p. 143, pl. 4, fig. 1.

1878. Hilgendorf, *l. c.*, p. 785, pl. 1, figs. 1–5 (*Podopisa petersii*).

1884. Miers, Zool. H.M.S. *Alert*, p. 523 (*petersii*).

1887. de Man, J. Linn. Soc. Lond., xxii, p. 19 (*petersii*).

1895. Alcock, *l. c.*, p. 218.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., ii, p. 687.

1910. Lenz. Voeltzkow Reise Ostafr., ii, p. 541 (*Naxia h.*).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 253.

1942. Ward, Mauritius Inst. Bull., ii, p. 73.

Rostral spines nearly parallel. Carapace with regions well defined, unevenly granular and tubercular; 2 stout spines on each branchial region, a large median tubercle on hind margin, and a smaller one

laterally on pterygostomial region. Supra-orbital spine obsolete. Basal joint of ant. 2 with stout spine at outer apex and a tooth in middle of outer border. No spine at apex of 4th joint of 2nd–5th legs.

Length (to fork of rostrum) 46 mm., breadth 33 mm.

Locality.—Mozambique (Hilgendorf).

Distribution.—Mauritius, Zanzibar, Amirante Is., Seychelles, Maldives and Laccadives, Ceylon, Andaman Is., Philippine Is.

Remarks.—*N. robillardi* Miers (1882, Proc. Zool. Soc. Lond., p. 339, pl. 20, figs 1, 1, *a–c*) from Mauritius, differs in having more numerous and sharper spines on carapace, and a spine at end of 4th joint on 2nd–5th legs.

Gen. Hyastenus White

1847. White, Proc. Zool. Soc. Lond., p. 56.

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 206.

1894. Ortmann. Semon's Austral. Reise, v, p. 41 (key to species).

1913. Calman, Ann. Mag. Nat. Hist. (8), xi, p. 313 (validity of name).

1917. Stebbing, Ann. S. Afr. Mus., xvii, p. 25.

1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 103, fig. 4 (figures of plp. 1 ♂).

[*Halimus* Rathbun 1897, Stebbing 1908 and 1910, not Latreille.]

Carapace pyriform. Rostral spines long, divergent, without accessory spinules. Supra-orbital ridge prominent, anteriorly more or less spiniformly produced, separated from the post-ocular tooth by a narrow, often half-closed or keyhole-shaped slit. Basal joint of ant. 2 broad, outer apex sometimes acutely produced. Chelipeds in ♂ enlarged; 2nd leg usually much longer than the others. Abdomen with 7 segments in both sexes.

Hyastenus spinosus M. Edw.

Fig. 11, *f*.

? 1851. Bianconi, Spec. Zool. Mosambic, fasc. 5, p. 75 (*Chorinus aries* M. Edw.).

1872. Milne Edwards, Nouv. Arch. Mus. Paris, viii, p. 250.

? 1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 786 (*C. aries*).

1895. Alcock, *l. c.*, p. 211.

1910. Stebbing, *l. c.*, p. 285 (*Halimus diacanthus*, non de Haan).

1917. *Id.*, *l. c.*, p. 25 (*uncifer* non Calman).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*diacanthus* var. *spinosus*).

Rostral spines $\frac{1}{2}-\frac{2}{3}$ length of rest of carapace, shorter in ♀. Carapace (when denuded) smooth and polished, 2 median spines, or a spine and a tubercle, on gastric region, a low truncated prominence on cardiac region, a strong median spine near hind margin, a strong spine on the branchial region projecting laterally, a tooth on subhepatic region. Supra-orbital ridge anteriorly shortly acute. Outer apex of basal joint of ant. 2 quadrate but not acutely produced. Dactyls of legs with a single row of denticles on inner margin, except on 2nd leg where there are only 2–3 apically. Sternum of ♂ with deep hollows at bases of legs.

Length up to 80 mm., breadth (incl. branchial spines) 48 mm. Reddish or brownish.

Localities.—Mozambique (M. Edwards); Natal (Stebbing and S. Afr. Mus.); Delagoa Bay (Barnard).

Distribution.—Fiji.

Remarks.—I have examined the specimen recorded as *uncifer* and find none of the special characters of Calman's species; it does not differ in any way from the specimen previously identified by Stebbing as *diacanthus*. The locality of this specimen was given as "Umsinduzi River, Pietermaritzburg," but it is unlikely that this species is found so far up a river in perfectly fresh water.

In the smallest specimens examined (9 mm. long) the tubercles on the gastric region are undeveloped and the median one on hind margin is very feeble; at 20 mm. the gastric tubercles are just developed.

Ward (1942) records *uncifer* from Mauritius.

Gen. Eurynome Leach

1879. Miers, J. Linn. Soc. Lond., xiv, p. 659.

1884. *Id.*, Zool. H.M.S. *Alert*, p. 523.

1894. Milne Edwards and Bouvier, Res. Sci. Camp. Monaco, vii, p. 14.

1906. Baker, Trans. Proc. Roy. Soc. S. Austral., xxx, p. 108.

1910. Stebbing, *l. c.*, p. 289.

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 454.

1929. Balss, *l. c.*, p. 12.

Carapace pyriform, covered with granules and tubercles, but few spines. Rostral prongs flattened (dorso-ventrally), divergent, apically acute. Eye-socket deep, eyes completely retractile. A slight notch between base of rostrum and supra-orbital ridge, but no supra-orbital tooth. Post-ocular tooth separated from supra-orbital ridge by a

narrow slit containing a small denticle. Basal joint of ant. 2 broad at base, longitudinally grooved, outer apex not produced. Chelipeds in ♂ elongate, rather robust; walking legs short; chelipeds and legs more or less granulate or carinate. Abdomen with 7 segments in both sexes.

Remarks.—This genus is allied to *Hyastenus* although the chelipeds resemble those of the *Parthenopidae.*

Key to the South African Species.

1. Legs tuberculate and carinate. 5 tubercles on either side of the central one on cardiac region . . . . *aspera.*
2. Legs smooth, but with a thin carina on 4th joint. Tubercles more numerous and more equal in size, without definite arrangement on cardiac region . . . . *elegans.*

Eurynome aspera (Penn.)

Fig. 12, *a–c.*

1777. Pennant, Brit. Zool., iv, p. 13, pl. 10, fig. 3 (*Cancer asper*).

1853. Bell, Brit. Stalk-eyed Crust., p. 46, fig.

1857. Stimpson, Proc. Ac. Nat. Sci. Philad., ix, p. 220 (*longimana*).

1893. Rathbun, Proc. U.S. Nat. Mus., xvi, p. 102, pl. 8, fig. 1 (*longimana*).

1900. Milne Edwards and Bouvier, "Talisman" Crust., i, p. 125, pl. 19, figs. 7–15 (literature, synonymy).

1904. Doflein, D. Tiefsee Exp., vi, p. 79.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 27, pl. 4, fig. 2, (*longimana*).

1910. Stebbing, *l. c.*, p. 289 (*longimana*).

1914. Lenz and Strunck, D. Südpol Exp., xv, p. 275 (*longimana*).

1918. Pesta, Dekapoden Adria., p. 352.

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 20.

Rostral horns rather broad. Carapace with regions well marked, with flat-topped, mushroom-like tubercles, not very numerous nor closely crowded, more or less symmetrically arranged, but variable in size; the most constant are 4 tubercles on gastric region behind a pair of conical tubercles, a row of 5 on either side of a central one on cardiac region, and a row of 5 on hind margin, the outermost one on each side somewhat projecting, with another even larger submarginal one (making a row of 7 in all); a row on the postero-lateral margin; a flattened ridge-like tubercle, capped with 2 flat-topped tubercles on

each anterior branchial region, and a more triangular one on posterior branchial region; laterally a large triangular hepatic tooth, and 3 branchial teeth, the hindmost one subspiniform and granulate, all 4 dorso-ventrally flattened. Some of the major tubercles are sometimes enlarged, those on the gastric and cardiac regions so much so as to be coalescent, forming a shield-like tubercle (var. *scutellatus*).

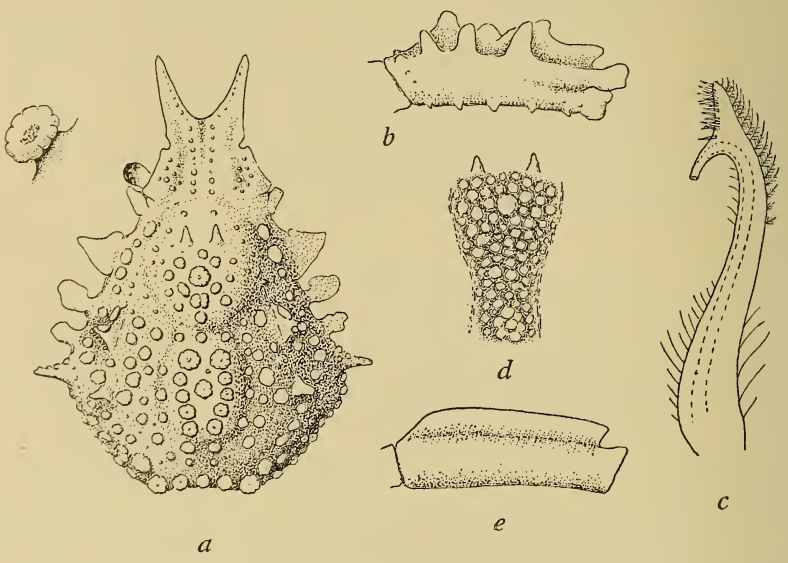


Fig. 12.—*Eurynome aspera* (Penn.). *a*, carapace ♀ (cleaned), with tubercle further enlarged. *b*, 4th joint of leg. *c*, ventral view of left 1st pleopod ♂. *Eurynome elegans* Stebb. *d*, sculpturing on portion of gastric and cardiac regions of carapace ♀. *e*, 4th joint of leg.

Supra-orbital ridge granulate, but not heavy. Chelipeds with conical tubercles and granules; legs carinate and tuberculate, 4th joint with 3 large tubercles on hind upper edge and 3–4 on front upper edge, the latter sometimes united into an undulate carina. 1st pleopod ♂ (fig. 12, *c*) with apex curving inwards (not outwards).

Length up to 14 mm., breadth 10 mm. Chalky white or pinkish, with pink or reddish specks or mottling, and bands on legs.

Localities.—False Bay (Stimpson, Stebbing, Lenz and Strunck); off Cape Point, 145 fathoms,* False Bay and Agulhas Bank to Cape Natal (Durban), 24–54 fathoms (S. Afr. Mus.).

* This specimen may be wrongly labelled; cf. *Dehaanius dentatus*; the specimens probably came from considerably shallower water.

Distribution.—N. Atlantic to Cape Verde Is., Mediterranean, Port Alexander, Angola, 108 metres.

Remarks.—Although I have made no direct comparison with European specimens of *aspera*, there seems no reason to separate *longimanus* as a distinct species. The 1st pleopod ♂ may be the crucial feature. The South African specimens, like the European ones, are very variable, and include a specimen of the var. *scutellatus* (*cf.* Bell, 1855, Trans. Linn. Soc. Lond., xxi, p. 305, footnote). Odhner's record from Angola bridges the gap between the West African and the Cape records.

I have seen no specimens exactly corresponding with Stimpson's figure, which shows, *e.g.*, a **V**-shaped gap between the rostral horns instead of a **U**-shaped gap, a large triangular tooth between the lateral hepatic and branchial teeth, and the 4th joint of cheliped smooth except for 3 denticles on the inner (anterior) margin. Yet there cannot be the slightest doubt that the two forms (if the figure is correct) are identical.

Eurynome elegans Stebb.

Fig. 12, *d*, *e*.

1921. Stebbing, Ann. S. Afr. Mus., xviii, p. 454, pl. 13 (Crust., pl. 108).

♀. Rostral horns rather slender (too broad in Stebbing's figure). Carapace more oval in general outline than in *aspera*, closely covered with numerous granular tubercles (not mushroom-shaped), regions less well marked. A pair of gastric conical tubercles, a group of 3 or 4 tubercles on middle of cardiac region, not enlarged but a little more elevated than the surrounding tubercles, a pair of elevated tubercles on anterior branchial region, and one on posterior branchial region; a ridge of tubercles on hind margin. Supra-orbital ridge thickened, tabulate; post-ocular tooth more acute and projecting more forward than in Stebbing's figure. A large laminar triangular hepatic tooth laterally, followed by 4 smaller nodular projections on branchial region, the hindmost one not larger or more laterally prominent than the others. Chelipeds missing. Legs cylindrical, not tuberculate or carinate, except the 4th joint which has a thin semi-transparent keel on upper margin.

Length 10 mm., breadth 6 mm.

Locality.—Off Cape Vidal, Zululand, 80 fathoms (Stebbing).

Remarks.—Only the one ♀ known. Both in general outline and the cylindrical walking legs this species bears a likeness to the South Australian *granulosa* Baker 1906 (*l. c.*), though in the latter there are no keels on the 4th joints of the legs.

Family MAMAIIDAE.

1910. Stebbing, *l. c.*, p. 290.

The basal joint of ant. 2 very broad, its outer apex more or less spiniformly produced. The orbits are always complete enough to conceal the retracted cornea.

Key to the South African Genera.

1. Rostrum horizontal.
   - *a.* Rostral prongs short.
     - i. Eye-stalk slender, curved, cornea oblique, more ventral than terminal . . . . . *Mamaia.*
     - ii. Eye-stalk short, cornea globular, terminal (fig. 13, *b*) . . . . . *Schizophrys.*
   - *b.* Rostral prongs long, nearly half length of carapace . *Acanthophrys.*
2. Rostrum deflexed, vertical or nearly so (fig. 13, *c*) . . *Micippa.*

Stenocionops furcata (Oliv.) (Stebbing, *l. c.*, 1910, p. 291, and see Rathbun, *l. c.*, 1925, p. 449, pls. 160, 161) is an American species recorded by Miers from Simon's Bay. Probably an error in labelling has occurred (see Introduction, p. 3) and the species is not admitted here to the fauna-list.

Gen. Mamaia Stebb.

1909. Calman in Lankester's Treatise Zool., vii, p. 316 (*Maia* Lam. 1801, non Brisson 1760, Aves).

1910. Stebbing, *l. c.*, p. 290.

Carapace broadly pyriform, regions indistinct, granular or spinose, lateral margins usually with large spines or spiniform teeth. Rostrum horizontal, of 2 rather short straight, divergent horns. Inter-antennular spine well developed. Supra-orbital ridge with hind corner produced in a spine; intermediate tooth present; post-ocular tooth strong, spiniform. Basal joint of ant. 2 with both outer and inner (ventral) apices produced in spines. Eye-stalks long, curved, cornea oval, mostly on the ventral surface. Chelipeds slender, finger and thumb styliform. Legs not long. Abdomen with 7 segments in both sexes.

Mamaia capensis (Ortm.)

Agulhas Spider-crab.

Fig. 13, *a*.

1894. Ortmann, Semon's Austral. Reise, v, p. 40 (*squinado* var. *capensis*).

1908. Stebbing, Mar. Invest. S. Afr., vi, p. 3, pl. 1 (Crust., pl. 27) (*queketti*).

1910. *Id.*, *l. c.*, p. 290 (*queketti*).

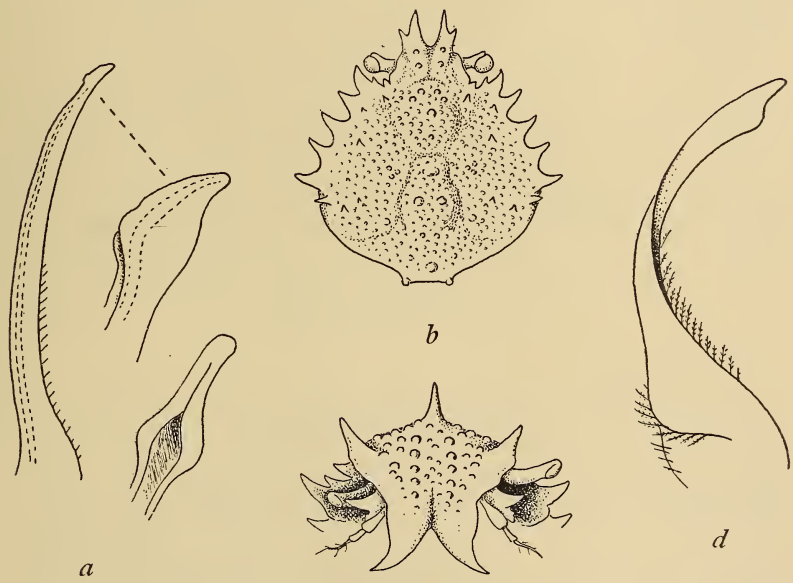


Fig. 13.—*Mamaia capensis* (Ortm.). *a*, 1st pleopod ♂, with inner view of apex. *Schizophrys aspera* (M. Edw.). *b*, carapace. *Micippa thalia* (Herbst). *c*, frontal view, fringe of setae on ant. 2 omitted. *d*, 1st pleopod ♂.

Behind the post-ocular tooth 4 marginal spine-teeth, followed by one submarginal on hinder part of branchial region; in the middle line 3 spines on gastric region, a transverse pair (Stebbing: "a stout bifid spine"), one on hinder gastric region, one on cardiac region, a transverse pair of spines and a large median one on intestinal region; an oblique row from the branchial-gastric groove; a few other irregularly placed moderate spines; rest of surface with setiferous

granules, tubercles and small spines; a pair of short spines on hind margin. Cheliped with granules on 4th and 5th joints, finger and thumb gaping at base in fully grown ♂. No prominent spine at apex of 4th joint of legs.

Length up to 145 mm., breadth (excl. lateral spines) 100 mm. Orange-red to carmine.

Localities.—Algoa Bay (Ortmann, Stebbing); False Bay to Algoa Bay, 16–55 fathoms (S. Afr. Mus.).

Remarks.—Whether this form be regarded as a variety of *squinado*, *verrucosa*, or *spinigera*, or as a separate species, Ortmann's name, which Stebbing seems to have overlooked, must be adopted in place of Stebbing's.

This crab, the largest of the South African Spider-crabs, was not obtained farther eastwards than Algoa Bay by the *Pieter Faure*, and it would seem, therefore, that Stebbing's specimen ex Durban Museum was also probably an Algoa Bay specimen (Stebbing, *l. c.*, 1908, p. 2).

M. squinado is recorded from as far south as the coast of Mauritania (Monod, Bull. Com. Et. sci. Afr. occid. Franc., xv, p. 52, 1933).

Gen. Schizophrys White

1910. Stebbing, *l. c.*, p. 292.

Carapace broadly pyriform, regions well marked, granulate and tuberculate, lateral margins spinose. Rostrum of 2 stout spines, with 1–2 accessory spines or denticles on outer margin. Inter-antennular spine not very prominent. Intermediate tooth present, but neither it nor the supra-orbital ridge prominent. Basal joint of ant. 2 apically bifurcate. Eye-stalks short, stout, cornea globular, terminal. Chelipeds slender; legs not long. Abdomen with 7 segments in both sexes.

Schizophrys aspera (M. Edw.)

Fig. 13, *b*.

1838. McLeay, Annulosa S. Afr., p. 58 (*Mithrax quadridentatus*).

1880. Richters, Meeresf. Mauritius, p. 143, pl. 15, figs. 8–14 (*triangularis* var. *indica*).

1910. Stebbing, *l. c.*, p. 292.

1911. Rathbun, Trans, Linn. Soc. Lond., xiv, p. 254.

1917. Stebbing, Ann. Durban Mus., ii, p. 2 (references).

1927. Hale, S. Austral. Crust., pt. 1, p. 138, fig. 139.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 390 (*asper*).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 108 (*dama* Herbst 1804).

Carapace breadth about $\frac{9}{10}$ length from forking of rostrum to hind margin; surface closely and unevenly granular, with scattered acute tubercles. Post-ocular tooth bifid. Lateral margin with 5–6 spines. Corners of hind margin tuberculate, somewhat up-turned. Each rostral horn with a single accessory denticle. A conical tubercle on subhepatic region, and a smaller one in middle of lower rim of orbit. Chelipeds with 4th and 5th joints tuberculate, 6th joint smooth, finger and thumb gaping in old ♂.

Length up to 51 mm., breadth 45 mm.

Localities.—Durban (Stebbing); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Indo-Pacific to Japan, Australia, Samoa.

Remarks.—A variable but easily recognized species. Ward (1942, Mauritius Inst. Bull., ii, p. 74) considers that there are several distinct species, and records Mauritian specimens under the name *serratus* White.

Gen. Acanthophrys M. Edw.

1834. Milne Edwards, H., Hist. Nat. Crust., i, p. 323 (*Paramithrax*).

1865. Milne Edwards, A., Ann. Soc. Entom. Fr. (4), v. p. 140 (*Acanthophrys*).

1880. Haswell, Proc. Linn. Soc. N.S.W., iv, p. 442 (*Chlorinoides*).

1906. Bouvier, Bull. Mus. d'Hist. Nat. Paris, no. 7, pp. 485 *sqq.* (*Acanthophrys*, key to species).

1929. Balss, *l. c.*, p. 19.

The above references do not indicate synonymy. I am not able to discuss whether *Acanthophrys* should be included in *Paramithrax* (*cf.* Miers, Rep. H.M.S. *Challenger*, xvii, p. 52), but it seems clear that *Chlorinoides* is a synonym of *Acanthophrys*, and that if *Chorinus aculeata* M. Edw. 1834 is included in *Acanthophrys*, as is done by Bouvier, the specific name must be changed, as the combination *Acanthophrys aculeata* is void, having been used by A. Milne Edwards in 1865, although the latter species has now become a synonym of *A. spatulifer* Hasw.

Acanthophrys longispina (de Haan)

1839. de Haan, Faun. Jap. Crust., p. 94, pl. 23, fig. 2 (*Maja* (*Chorinus*) *l.*).

1882. Haswell, Proc. Linn. Soc. N.S.W., vi, p. 750 (*Paramithrax coppingeri*).

1882. *Id.*, Cat. Austral. Crust., p. 15 (*Paramithrax coppingeri*).

1884. Miers, Crust. H.M.S. *Alert*, p. 522 (*Paramithrax* (*Chlorinoides*) *l.* var. *bituberculatus*).

1895. Alcock, J. Asiat. Soc. Bengal, lxiv, p. 242 (*Paramithrax* (*Chlorinoides*) *l.*).

1906. Bouvier, *l. c.*, pp. 487 (in key), 488 (and var. *spinosissima*).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 254 (*Chlorinoides l.*).

[Not *coppingeri* Miers, 1886 = *spatulifer*. Miers misquotes the reference to *coppingeri*; the reference given is that of *Chlorinoides tenuirostris*.]

Carapace pyriform, with long (but slightly less than half length of rest of carapace) divergent rostral prongs; 5 spines in median line: 2 on gastric region, one cleft transversely on cardiac region, one on intestinal region, and one on hind margin; 2 on each branchial region; supra-ocular and pterygostomial spines prominent (for general habitus cf. *P. aculeatus* Miers, 1884, *l. c.*, pl. 18, fig. A). All the spines, including rostral prongs, terminated by button-like knobs. Upper and lower margins of 4th joint of chelipeds keeled and scalloped, upper margin of 5th joint also keeled. All walking legs with a distinct knobbed spine at apex of 4th joint. Antero-external angle of basal joint of ant. 2 produced as a curved foliaceous lobe.

Locality.—Mozambique, 20–25 fathoms (Bouvier: var. *spinosissima*).

Distribution.—Japan; Darros (Amirante) and Providence Groups (Miers and Rathbun); Ceylon, Madras, Andaman Is.; N.E. Australia; New Caledonia.

Gen. Micippa Leach

1910. Stebbing, *l. c.*, p. 290.

Carapace oblong, granulate and spinose. Rostrum a broad lobe, vertically or nearly vertically deflexed, apically bifid. Supra-orbital ridge strongly arched, contiguous with post-ocular tooth, or an intermediate tooth present. Basal joint of ant. 2 broadly expanded, forming floor of orbit, and with its apex produced; mobile portion of antenna visible dorsally. Chelipeds slender; legs not long. Abdomen with 7 segments in both sexes.

Micippa thalia (Herbst)

Fig. 13, *c*, *d*.

1851. Bianconi,* Spec. Zool. Mosambic, fasc. 5, p. 79 (Crust. pl. 1, fig. 2) (*aculeata*).

1869. *Id.*, *ibid.*, fasc. 19/20, p. 339 (Crust., pl. 3, fig. 1) (*pusilla*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 786 (*aculeata*), p. 787 (*pusilla*).

1910. Stebbing, *l. c.*, p. 290.

Rostrum widely notched, each lobe ending in a sharp outwardly curving tip. Carapace closely and evenly granulate; a strong spine on supra-orbital ridge, 2 in middle line on gastric region, 2 obliquely on branchial region; the hinder and outer one of the latter might be reckoned in the lateral series, which consists of 6–8 unequal and irregular spines; post-ocular tooth strongly spiniform; intermediate tooth present. All spines somewhat variable. Carapace and legs (walking) thickly covered with a woolly tomentum; margins of rostrum and the 2nd and 3rd joints of antenna 2 with thick fringe of long setae.

Length up to 40 mm., breadth (excl. lateral spines) 35 mm.

Localities.—Natal (Krauss, Stebbing); Mozambique (Bianconi, Miers); Delagoa Bay (coll. van der Horst).

Distribution.—Indo-Pacific to Japan.

Remarks.—*M. philyra* var. *mascarenica* occurs at Mauritius.

Family PARTHENOPIDAE.

Calthrop Crabs.

1910. Stebbing, *l. c.*, p. 292.

1930. Flipse, Siboga Exp. monogr., xxxix, c. 2, pp. 1–96, figs. (key to genera).

1934. Gordon, Res. Sci. Voy. Ind. orient. Néerland., iii, fasc. 15, p. 62 (*Eumedoninae* only).

Eyes retractile in small circular orbits, whose floor is continued nearly to the front, the small gap filled by 2nd joint of ant. 2. Basal joint of latter small, embedded between lower angle of orbit and socket of ant. 1. Chelipeds usually very robust, and much larger and heavier than the walking legs.

* Bianconi also published his species in Mem. Ac. Sci. Bologna, iii, 1851, p. 103, pl. 10, fig. 2, and ix, 1869, p. 205, pl. 1, fig. 1, respectively (references apud Alcock, 1895).

Key to the South African Genera.

1. Basal joint of ant. 2 nearly reaching inner angle of orbit. Fingers of chelipeds slightly incurved. Walking legs strongly tuberculate . . . . . *Parthenope.*
2. Basal joint of ant. 2 very short, not nearly reaching inner angle of orbit. Fingers very strongly incurved. Walking legs smooth or feebly tuberculate . . *Platylambrus.*

Gen. Parthenope Fabr.

1905. Stebbing, J. Linn. Soc. Lond., xxix, pp. 332 *sqq.* (*Parthenope* Weber 1795 not acceptable, hence *Daldorfia* Rathbun 1904 unnecessary).

1910. *Id.*, *l. c.*, p. 292.

1930. Flipse, *l. c.*, p. 57 (key to Indo-Pacific species).

Characters as in key.

Parthenope horrida (Linn.)

1910. Stebbing, *l. c.*, p. 292.

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 259 (*Daldorfia h.*).

1930. Flipse, *l. c.*, p. 58.

1942. Ward, Mauritius Inst. Bull., ii, p. 76 (*Daldorfia h.*).

Carapace somewhat pentagonal, postero-lateral angles strongly produced, length nearly ¾ the breadth; surface very rugged with deep cavities, more or less tuberculate. Rostrum short, ending below in a blunt inter-antennular tooth. Chelipeds very large and robust, one larger than the other, coarsely tuberculate. Legs stout, strongly tuberculate or spiniferous, dactyls smooth. Sternum ♂ deeply pitted, with a deep crescentic hollow between bases of chelipeds. Abdomen of ♀ with deep pits along each side.

Length up to 75 mm., breadth 102 mm. Variable in colour according to its surroundings, greyish, brownish, greenish, more or less mottled or variegated.

Locality.—Natal (Stebbing).

Distribution.—Mauritius; Indo-Pacific.

Remarks.—A sluggish crab, lying quietly amongst pebbles, corals, and rough ground, with which the rugged carapace and the jagged chelipeds harmonize.

Gen. Lambrus Leach

Subgen. *Platylambrus* Stimpson

1879. Miers, Ann. Mag. Nat. Hist. (5), iv, pp. 17, 18 (*Platylambrus* not accepted).

1910. Stebbing, *l. c.*, p. 292.

1917. *Id.*, Ann. Durban Mus., ii, p. 3.

1925. Rathbun, Bull. U.S. Nat. Mus., no. 129, p. 511 (*Parthenope* Weber, non Fabr.) and p. 516 (*Platylambrus*).

1930. Flipse, *l. c.*, p. 21 (*Lambrus*) and p. 23 (*Platylambrus*).

1939. Ward, Amer. Mus. Novit., 1049, p. 2.

Characters as in key. Particular characters of subgenus: carapace broadly triangular, broader than long, strongly carinated and tuberculate, rostrum projecting, triangular, acute, no post-ocular constriction, chelipeds with 4th and 6th joints straight (not contorted), sharply trigonal, outer margin of 4th–6th joints sharply serrated.

Platylambrus quemvis Stebb.

Fig. 14.

? 1851. Bianconi, Spec. Zool. Mosambic, fasc. 5, p. 81 (Crust., pl. 2, fig. 2) (*L. serratus* var. *mosambicana*).

? 1878. Hilgendorf, MB. Ac. Wiss. Berlin, p. 787 (*L. serratus* var. *mosambicana*).

1917. Stebbing, *l. c.*, p. 3, pl. 1.

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 455.

Carapace rounded behind, *i.e.* postero-lateral margins not in line with hind margin, 3 large compressed tubercles in middle line, an oblique tuberculate ridge on each branchial region, with a less distinct row of tubercles in front and another behind it; postero-lateral margin with 3 teeth decreasing in size from the outermost lateral one; hind margin with 3 teeth, the centre one usually with an accessory denticle on each side. Infra-orbital tooth entire, visible in dorsal view (when eyes are retracted). Cheliped with about 9 teeth on outer margin of 6th joint, 4 large alternating with smaller ones, 2 of the latter between the ultimate and penultimate larger ones. Legs with upper margin of 4th joint with a few (6–8) spaced denticles, the uppre margin of 5th and 6th joints feebly carinate on 2nd–4th legs, but also

with a few denticles on the 5th leg (denticles obscure on 6th joint); lower margins of joints in all legs smooth. The median teeth, branchial ridge, and hollowed sternum are particularly well marked in young examples.

Length up to ♂ 28 mm., breadth 35 mm. (incl. lateral spines);

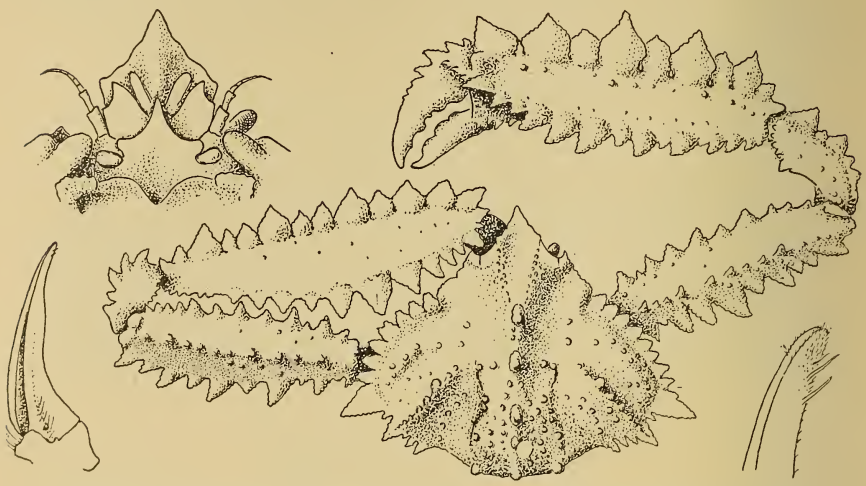


Fig. 14.—*Platylambrus quemvis* Stebb. Carapace, on left side the eye is retracted, and cheliped folded in resting position; ventral surface of rostrum; 1st pleopod ♂, with apex further enlarged.

ovigerous ♀ 19 × 24 mm. Grey or pale purplish, with lighter patches on chelipeds, finger and thumb dark, walking legs banded.

Localities.—Durban, and off Tongaat River, 30 fathoms (Stebbing); Natal coast from Durban to Port Durnford, 27–36 fathoms, and Delagoa Bay (S. Afr. Mus.).

Remarks.—This will probably prove to be a variety of *pransor* (Herbst).

Stebbing (1910, *l. c.*, p. 292) records a species of "*Lambrus*" from "Umsunduzi River, Pietermaritzburg." This inland locality is certainly due to an error in labelling and is not acceptable (cf. *Hyastenus spinosus*).

Family HYMENOSOMATIDAE.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., ii, pp. 682, 684 (*Hymenosomidae*).

1910. Stebbing, *l. c.*, p. 331.

1917. Kemp, Rec. Ind. Mus., xiii, pp. 243 *sqq.* (Indian species).

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 3 (*Hymenosomidae*).

1925. Rathbun, Bull. U.S. Nat. Mus., no. 129, pp. 9, 561 (*Hymenosomidae*).

1927. Hale, Crust. S. Austral., pt. 1, p. 115.

1930. Chopra and Das, Rec. Ind. Mus., xxxii, pp. 413 *sqq.*

Carapace flat, thin and not well calcified, without hooked setae, usually with horizontal rostrum. No orbits, eyes exposed and little retractile. Peduncle of ant. 2 slender. Antennular sockets shallow, ill-defined. Chelipeds not long or especially mobile. Male genital openings on last thoracic sternite (concealed beneath abdomen); female openings on sternite of 2nd (1st walking) legs.

Remarks.—Development sometimes without free-swimming stages, the young crabs hatching from the eggs while protected by the abdomen of mother.

Key to the South African Genera.

1. No epistome. Carapace with grooves. Mxp. 3 slender. Dactyls smooth. All segments of abdomen in ♂ distinct . . . . . *Hymenosoma.*
2. Epistome well defined. Segments 3–5 of abdomen in ♂ fused.
   - *a.* Carapace with regions defined by grooves. Mxp. 3 narrow, not completely closing buccal cavity. Dactyls with (usually) numerous denticles. Rostrum (usually) tridentate . . . . *Rhynchoplax.*
   - *b.* Carapace with regions not defined, smooth. Mxp. 3 broad, completely closing buccal cavity. Dactyls with subapical denticles only. Rostrum broadly triangular . . . . . *Elamena.*

Gen. Hymenosoma Desm.

1910. Stebbing, *l. c.*, p. 331.

1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 269.

1917. Kemp, *l. c.*, pp. 244, 250.

1918. Tesch, *l. c.*, p. 5.

Carapace subcircular, regions defined by fine grooves. No epistome. Buccal cavity not limited anteriorly by a ridge. 3rd and 4th joints of mxp. 3 slender, not meeting in middle, the underlying appendages partly visible. Dactyls of walking legs without spines or denticles on inner margin. Abdomen of ♂ short, narrow, sutures of all the

segments distinct; in ♀ suture between 6th and 7th segments often obscure. Eggs small and numerous. Development unknown.

Remarks.—The South African species is the only one known with certainty to belong to this genus as above defined. Another species, *H. depressum* Jacq. & Lucas, inhabiting New Zealand and the Auckland Is., was redescribed by Chilton (1907, Ann. Mag. Nat. Hist. (7), xix, p. 146, pl. 5), but without mention of those characters which would determine its generic position.

Hymenosoma orbiculare Desm.

Crown Crab.

Fig. 15, *a*, *b*.

1838. McLeay, Annulosa S. Afr., p. 68.
1894. Ortmann, Semon Austral. Reise, v, p. 37.
1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 368.
1910. Stebbing, *l. c.*, pp. 331, 332 (*geometricum*).
1913. Balss, Schultze Reise Südafr, v, p. 110 (var. *geometricum*).
1914. Stebbing, *l. c.*, p. 270, pl. 25, fig. A.
1914. Lenz and Strunck. D. Südpol Exp., xv, p. 277.
1915. Stebbing, Ann. S. Afr. Mus., xv, p. 58.
1917. Kemp, *l. c.*, p. 245 and footnote, fig. 1.
1918. Tesch., *l. c.*, p. 6, pl. 1, fig. 1.

The flat dorsal surface, which is longer than broad, is surrounded by a beaded and granulate rim (like the crown of a hat), continued on to rostrum, which is concave above, with slightly up-turned apex, and a granulate callosity on each margin at base; dorsal regions more or less granulate; lateral branchial and hepatic regions granulate, the latter with a tooth (variable in size) and a low rounded granulate prominence; infero-external angle of orbit produced in a bifid tooth, the upper tooth reaching to or slightly beyond apex of rostrum. Chelipeds furry, granulose on 4th and 5th joints. Legs setose, heavily fringed on hind margins of 4th–7th joints, the dactyls (7th joints) slender with sharp ungues. Carapace covered with scattered setae dorsally, more thickly on the lateral parts. 1st pleopod ♂ (fig. 15, *b*) sometimes with a few denticles on inner edge of apex beyond the fringe of setae.

Length up to 26 mm., breadth 25 mm. Reddish, yellowish, brownish or greenish, sometimes carapace mottled and legs banded.

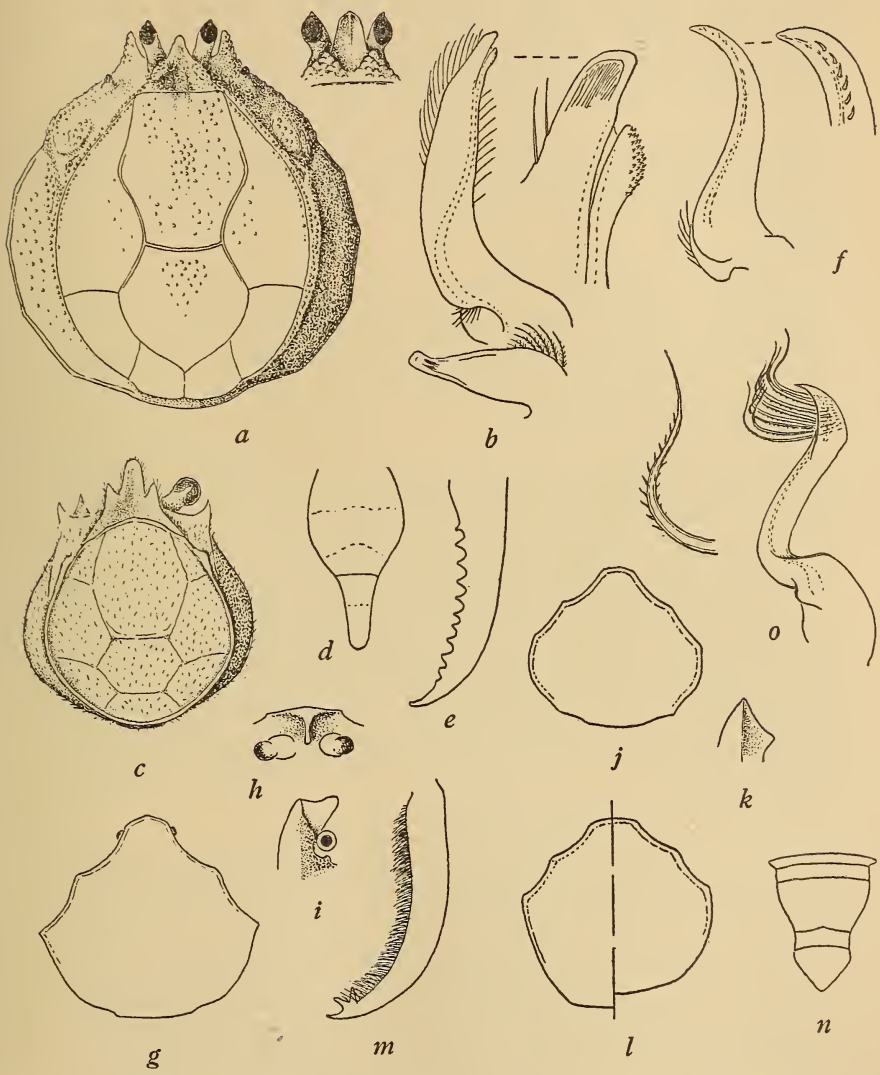


Fig. 15.—*Hymenosoma orbiculare* Desm. *a*, carapace, with variation of rostrum. *b*, 1st and 2nd pleopods ♂, apex of former further enlarged.

Rhynchoplax bovis Brnrd. *c*, carapace, left eye omitted to show infra-orbital tooth. *d*, abdomen of ♂. *e*, dactyl of walking leg, plumose setae omitted. *f*, 1st pleopod ♂.

Elamena mathaei (Desm.). *g*, carapace of ♀ (Zululand). *h*, *i*, ventral and lateral views of rostrum of this ♀. *j*, carapace of ♀ (Port Alfred). *k*, lateral view of rostrum of this ♀. *l*, carapace, ♂ left, ♀ right (Umhlali, Natal). *m*, dactyl of walking leg. *n*, abdomen of ♂. *o*, 1st pleopod ♂, with one apical seta further enlarged.

Localities.—Luderitzbucht (Balss); Saldanha Bay (Stebbing); Table Bay (Krauss, Balss, Lenz and Strunck, Tesch); False Bay, 0–18 fathoms (Stimpson, Miers, Stebbing, Lenz and Strunck); Agulhas Bank, St. Francis Bay, 80 metres, and Algoa Bay (Doflein); Algoa Bay (Ortmann); Natal (Stebbing); mouth of Olifants R. (van Rhyns Dorp Division), Lamberts Bay (Clanwilliam Division), Saldanha Bay, Table Bay, and False Bay to East London, 0–45 fathoms (S. Afr. Mus.).

Distribution.—Zanzibar (Lenz).

Remarks.—As Balss states, the 3rd and 4th joints of mxp. 3 are not so wide as shown in the figure in Cuvier's Règne Animal Crust., pl. 35, fig. 1, *a*; one may reasonably suspect the dried and matted fringe of setae on the inner margin misled the artist so that he drew the joints wider than they really were.

In all the specimens I have seen I have not found any difference which might constitute a specific difference; but the 3rd maxillipeds tend to be relatively longer and more slender in the ♂ than in the ♀. Stimpson's only specimen of *geometricum* was a ♂.

On the other hand, the spines and granulation of the carapace vary to a considerable degree. The rostrum usually does not quite reach the apices of the eye-stalks, but in some specimens tends to become longer, equalling or even slightly exceeding the eye-stalks. The two callosities at the base of the rostrum, the hepatic tooth and the granulations along the rim of the carapace may also be much more prominent (*cf.* fig. 15, *a*, normal and variation; see also Stebbing, 1905, Mar. Invest. S. Afr., iv, p. 51).

A remarkable development of the rostrum and the processes is shown in two ovigerous ♀♀, carapace width 6–7 mm., collected by the University of Cape Town Ecological Survey in False Bay, 19–24 metres. The whole animal is much more strongly setose than "normal" specimens, and the granulation on the crown and lateral regions of the carapace are more strongly developed and more sharply conical. The gastric region is raised into a setiferous median boss. The normal granules along the beaded rim are here conical projections, which increase in size from the hind margin to the middle of the lateral margin where there is a large conical setiferous projection; this is followed by clavate or digitiform processes; the hepatic tooth is well marked, pustulate or mammilate; the double tooth at outer orbital angle is also pustulate, and posterior to it is an additional conspicuous hepatic process. The most remarkable feature is the narrow triangular rostrum, which extends not only beyond the eye-

stalks, but also a short distance beyond the end of the peduncle of ant. 1, and is serrulate on the margins. The two low basal granulate callosities which are found in normal specimens are here developed into stout conical pustuliferous processes extending almost to apex of eye-stalks.

At first sight these specimens certainly look specifically distinct from normal *orbiculare*. But all the extraordinary features are merely exaggerations of the normal features, and cannot therefore be claimed as specific characters. The tendency to vary in this direction can be discerned in many normal specimens; but there is still a wide gap between the most strongly granulate "normal" specimens and these "abnormal" specimens. This gap may, however, be filled by the discovery of truly intermediate specimens.

Moreover, the institution of a n.sp. without a ♂ specimen would be inadvisable.

For the privilege of seeing these two specimens I am indebted to Professor J. H. Day, who is directing the University's Ecological Survey.

Although found in deeper water, this crab is a characteristic inhabitant of estuaries and lagoons all along the coast; it lives on, or buried just beneath, the surface of the sand and mud, or amongst Zostera and other weeds. It swims and buries itself by means of the very efficient fringed legs. It is often covered with bits of weed which disguise it. Juveniles (3–6 mm.) are less setose on the carapace and legs than adults.

Gen. Rhynchoplax Stimpson

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 109.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 387 (*Hymenicus*, non Dana).

1907. Stimpson (ed. Rathbun) Smiths. Misc. Coll., xlix, p. 147.

1917. Kemp, *l. c.*, p. 251 (key to Indian species).

1918. Tesch, *l. c.*, p. 17 (key to species, excl. Kemp's species).

1930. Chopra and Das, *l. c.*, pp. 414–424.

1932. Shen. Zool. Sinica, ix, p. 58.

Carapace subcircular, flattened or slightly concave dorsally, with raised rim, regions defined by sharp-cut grooves. Rostrum (usually) tridentate. Epistome well marked. Mxp. 3 narrow, not completely closing buccal cavity. Chelipeds stouter than walking legs; dactyls of latter (usually) with numerous denticles along inner margin. Abdomen of ♂ with 3rd–5th segments fused.

Remarks.—Development, in the South African species, without free-swimming stage.

Tropical Indian seas to China, Japan, S.E. Australia. Entering estuaries or even fresh water permanently above tidal influence (Kemp, *l. c.*, pp. 243, 264).

Rhynchoplax bovis Brnrd.

Fig. 15, *c–f.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 362.

Carapace subcircular, sparsely setose, dorsal rim continuous across base of rostrum; the latter tridentate, the median tooth larger than lateral ones, concave and somewhat spatulate dorsally. A strong, sharp post-ocular tooth, and a sharp infra-orbital tooth. No teeth on antero-lateral or lateral margins, but often a slight projection or shoulder antero-laterally. Chelipeds smooth, without keels and unarmed, inner margins of finger and thumb smooth in both sexes, in ♀ meeting along whole length, in ♂ gaping at base and meeting only in distal third, where they are somewhat spatulate. Walking legs rather stouter than in most species (but not so stout as in *demeloi* Kemp), upper apex of 4th joint slightly projecting, but not spiniform, dactyls with 9–10 subequal denticles along inner margin, obscured by plumose setae. Abdomen of ♂ pyriform, the fused 3rd–5th segments narrowing rapidly distally, the 6th and 7th (whose intersegmental suture is obscure) narrow, digitiform.

Length up to ♀ 7 mm., breadth 5·5 mm. Greyish or brownish, usually much obscured by mud.

Localities.—Swartkops River, Port Elizabeth and off East London (S. Afr. Mus.); Buffalo River estuary, East London (coll. T. A. Stephenson); Amanzimtoti estuary, 1–2 fathoms, and St. Lucia Bay (Univ. Cape Town Ecol. Surv., 1946 and 1948).

Remarks.—Well distinguished from other species, apparently, by the strong post-ocular and infra-orbital teeth, which, however, are not always as strong as represented in the figure.

One ♀ (East London) contains 13 juveniles under the abdomen, apparently ready to be cast off. Diameter 1 mm. Rostrum feebly trilobate, the median lobe a little more prominent than the lateral ones, which are blunt. Post-ocular tooth relatively small, infra-orbital tooth not apparent. Dactyls with only 2–3 denticles on inner margin. Eyes relatively large. Another ♀ (Port Elizabeth) contains about 30 embryos in a less advanced stage.

A ♂ in the s.s. *Pieter Faure* collection was caught, according to the log-book, by tow-net attached to trawl which caught ground at 37 fathoms.

Gen. Elamena M. Edw.

1910. Stebbing, *l. c.*, p. 332.
1915. Kemp, Mem. Ind. Mus., v, p. 216.
1917. *Id.*, *l. c.*, p. 19 (key to species).
1918. Tesch, *l. c.*, p. 19 (key to species).
1920. Stebbing, Ann. Durban Mus., ii, p. 269.
1930. Chopra and Das, *l. c.*, p. 424.
1940. Gordon, Proc. Linn. Soc. Lond., 152 sess., pt. 1, p. 60 (species of *Elamena* sensu stricto).

Carapace oval, triangular, or polygonal, greatly depressed; no dorsal grooves; lateral margins up-turned or not; rostrum triangular or truncate, with (*Elamena*) or without (*Trigonoplax*) a large vertical ridge on its lower surface. Epistome well marked and separated from buccal cavity by a ridge. Mxp. 3 with 3rd and 4th joints broad, meeting in middle line. Dactyls of walking legs with 2 denticles near unguis. Abdomen in ♂ with 3rd–5th segments fused, the sutures obsolete.

Subgen. *Trigonoplax* M. Edw.

Carapace flatter and more triangular than in *Elamena* s.s., its margin not up-turned; chelipeds similar in both sexes and not appreciably stouter than walking legs; rostrum without a ridge on its lower surface, or with only a tooth situated far from front margin.

Key to the South African Species.

1. Rostrum with strong ridge ventrally, in front view T-shaped (fig. 15, *h*) (*Elamena*). Carapace subovoid or subcircular, or subpent-(hex-)agonal . . . . . *mathaei.*
2. Rostrum without ventral ridge or with only a small tooth far from front margin (*Trigonoplax*). Carapace trigonal . . . . . *unguiformis.*

Elamena mathaei (Desm.)

Fig. 15, *g–o.*

1918. Tesch, *l. c.*, p. 21.
1920. Stebbing, Ann. Durban Mus., ii, p. 266, pl. 29 (*Epialtus vetchi*).
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

1938. Gurney, Proc. Zool. Soc. Lond., ser. B, cviii, p. 77, pl. 4, figs. 34–37 (larval stage).

1940. Gordon, *l. c.*, p. 63, figs. 1, *a*, *b*, 2, 3, *a*, *b*, *c*.

1942. Ward, Mauritius Inst. Bull., ii, p. 78.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 362.

[Not Stebbing, *l. c.*, 1920, p. 269, pl. 30 = *E.* (*Trigonoplax*) *unguiformis*.]

♂. Carapace glabrous, slightly longer than broad, margins very feebly up-turned, posteriorly rounded, antero-lateral margins with 2 shallow but distinct emarginations, rostrum well developed, subtruncate but margins meeting in a distinct angle medianly, ventrally with strong median ridge or tooth, in frontal view T-shaped. Cornea of eyes just visible dorsally beyond edge of carapace. Chelipeds slender, finger and thumb subequal to hand, dilated and denticulate apically. Legs long and slender, 4th and 5th joints each with an apical spine or knob, 6th joint with a less distinct apical swelling (represented in Stebbing's figure as on base of dactyl), dactyls falcate, 2 denticles adjoining the acute unguis, inner margins densely furry. Abdomen triangular, lateral margin rather strongly sinuous, apex narrowly rounded. 1st pleopod corkscrew-like, with 8–9 long, finely plumose, spine-setae attached to dorsal surface at apex.

Length 3·5 mm., breadth 3 mm. Dirty yellowish grey, with specks on carapace and chelipeds.

♀. Similar to ♂ but carapace slightly broader than long, the antero-lateral emarginations slightly more distinct, a small and indistinct post-ocular tooth on ventral surface.

Length (nonovig. and ovig.) 4–6 mm., breadth 4·5–7 mm. Pale green with yellow legs (Stebbing); Delagoa Bay ♀ as in ♂, but without specks.

Localities.—Natal (Krauss); Durban (Stebbing); Isipingo (Natal), Zululand coast, and Delagoa Bay (Barnard, and S. Afr. Mus.); East London and Port Alfred, Umhlali and Umtwalumi (Natal) (coll. T. A. Stephenson).

Distribution.—Red Sea and Indian Seas; Mauritius.

Remarks.—Dr. Gordon thinks there can be no doubt about the identity of the specimens she refers to this species. There is, however, one doubtful point, viz. the meaning of Desmarest's descriptive phrase "carapace . . . in form of an equilateral triangle" (quoted in translation by Stebbing, *l. c.*, 1920, p. 270). One would suppose that Desmarest had before him a form like *E.* (*Trigonoplax*) *unguiformis*, and evidently Stebbing in 1920 (but not in 1900) assigned an un-

deserved mathematical exactitude to Desmarest's wording. Rüppell said he convinced himself of the identity of his species with that described by Desmarest by actual comparison of specimens at the Paris Museum (Rüppell, 1830, Red Sea Crabs, p. 22); and the figure he gives is by no means shaped like an equilateral triangle.

Probably all the earlier records should be ignored, unless types, or at least specimens from the original localities, are available. Dr. Gordon has now put this species on a surer foundation by describing the ♂ abdomen and 1st pleopod.

The South African specimens which I have examined agree with Dr. Gordon's diagnosis.

Stebbing's "*Elamena mathaei*" is rightly excluded by Dr. Gordon; on the other hand, I consider that Stebbing's "*Epialtus vetchi*" is clearly synonymous.

Elamena (*Trigonoplax*) *unguiformis* (de Haan)

1917. Kemp, *l. c.*, p. 277, figs. 28, 29.

1918. Tesch, *l. c.*, p. 25.

1920. Stebbing, Ann. Durban Mus., ii, p. 269, pl. 30 (*mathaei*, non Desm.).

1924. Hale, Trans. Roy. Soc. S. Austral., xlviii, p. 70, fig. 1 (var. *longirostris*).

1927. *Id.* Crust. S. Austral., pt. 1, p. 120, fig. 118 (var. *longirostris* McC.).

Carapace in form of an equilateral triangle, very flat, semi-transparent. Chelipeds slender, finger and thumb nearly as long as hand, feebly dilated and apically denticulate. Legs long and slender, 4th joint with apical spine, dactyls somewhat dilated, 2 denticles adjoining the acute unguis.

Length 10 mm., breadth 11 mm.

Locality.—Natal coast, 50 fathoms (Stebbing).

Distribution.—Japan; East Indies; Andaman Is. var. *longirostris*: Southern Australia.

Remarks.—Stebbing's *Pieter Faure* specimen was not returned to the South African Museum, and no further specimens have come to hand.

BRACHYRHYNCHA.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 426 (key to families).

1907. *Id.*, Ann. Mag. Nat. Hist. (7), xix, p. 481 (key to families).

1910. Stebbing, *l. c.*, p. 293 (*Cyclometopa*) + p. 312 (*Catometopa*).

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, pp. 1–461, pls. and text-figs. (American Grapsoid Crabs. Key after Borradaile).

1930. *Id.*, *ibid.*, no. 152, pp. 1–609, pls. and text-figs. (American Cancroid crabs. Key after Borradaile).

Carapace not narrowed in front, rostrum reduced or absent. Epistome usually well developed. Buccal cavity quadrate. Orbits well developed, though sometimes more or less incomplete. Female genital openings on sternite of 3rd (2nd walking) legs; male openings on 5th coxae or 5th sternite.

Key to South African Families (adapted from Borradaile).

I. Orbits complete. Carapace rarely elongate-oval. Rostrum often wanting. Flagellum of ant. 2 usually short and not hairy.

A. 5th joint of mxp. 3 not inserted at or near inner angle of 4th joint (fig. 16, *b*). Carapace usually squarish, sometimes round. Male genital openings sternal. (In no species is the right chela *always* larger than left.)

1. Small symbiotic crabs. Carapace more or less round, eyes and orbits very small (fig. 16) . . . . . *Pinnotheridae*, p. 77.

2. Free-living crabs.

a. Orbits wider, often much wider, than front (figs. 17, 18, 20, 21). 3rd maxillipeds meeting, or nearly so, in middle line. Carapace squarish or transversely oblong . *Ocypodidae*, p. 82.

b. Front at least as wide, usually wider than orbit (figs. 23, 25, *a*). 3rd maxillipeds not meeting.

i. Carapace transversely oval, strongly vaulted, sides arched (fig. 23, *a*). Terrestrial . . . *Gecarcinidae*, p. 109.

ii. Carapace square, not strongly vaulted, sides straight or only feebly arched (figs. 23, *b–f*, 25, *a*). If terrestrial, an opening fringed with hairs between bases of 3rd and 4th legs . . . *Grapsidae*, p. 110.

B. 5th joint of mxp. 3 inserted at or near inner angle of 4th joint (figs. 27, *a–c*). Carapace usually transversely oval or round. Male genital openings nearly always coxal. Right chela often larger than left.

1. 5th pair of legs flattened and adapted for swimming (figs. 28, *c, j*, 29, *d, k*) . . *Portunidae*, p. 139.
2. Legs not adapted for swimming.
   a. Freshwater crabs with branchial regions much swollen (fig. 34) . *Potamonidae*, p. 179.
   b. Marine crabs.
      i. 1st antennae folded longitudinally.
         α. Carapace subcircular. Flagellum of ant. 2 hairy . . . *Atelecyclidae*, p. 194.
         β. Carapace broadly oval or hexagonal. Flagellum of ant. 2 short, not hairy . . . [*Cancridae*, p. 194].
      ii. 1st antennae folded obliquely or transversely. Two families not sharply separated . { *Xanthidae*, p. 198; *Goneplacidae*, p. 281.

II. Orbits formed, but more or less incomplete. Carapace elongate-oval. Rostrum present. Ant. 2 with flagellum, when present, long and hairy . *Corystidae*, p. 302.

Family PINNOTHERIDAE.

Pea-crabs, Oyster-crabs, Mussel-crabs.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, pp. 284, 287, 293, 331 (*Pinnoteridae*).

1910. Stebbing, *l. c.*, p. 330 (date of Alcock misprinted as 1890).

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, pp. 9, 15, 61.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, 1, pp. 244–287.

1924. Hyman, Proc. U.S. Nat. Mus., lxiv, 7 pp., 6 pls. (larval stages).

1927. Hale, Crust. S. Austral., pt. 1, p. 172.

Carapace more or less membranous, subcircular or transversely oval. Orbits and eyes very small, cornea sometimes obsolescent, 4th joint of mxp. 3 often large, 3rd joint usually small; or 3rd and 4th fused, in which case the joint is directed obliquely or transversely inwards, and the palp is short; exopod small, more or less concealed. Male genital openings sternal.

Remarks.—Small crabs living commensally in bivalve molluscs, Ascidians, Holothurians, and worm-tubes, or parasitically on outer surface of Echinoids. The males are rare, free-swimming, and rarely found together with the females (Orton, Nature, cvi, p. 533, 1920; Kemp, Rec. Ind. Mus., xxiv, p. 117, 1922). Stebbing (1893, Hist. Crust., p. 99) quotes the ancient stories of the relations between the crab and the *Pinna*-shell; and Rüppell (1830, Beschr. 24 Krabben, p. 23) defends Hasselquist's observations on their habits.

The males, and also the young non-ovigerous females, often have long fringes of setae on the hind margins of the 3rd–5th legs, presumably in connection with their more mobile mode of life.

Key to the South African Genera.

1. 7th joint of mxp. 3 present (palp 3-jointed).
   a. Margin of carapace rounded, ill-defined . . . . *Pinnotheres.*
   b. Margin of carapace sharply up-turned, crest-like . . *Xanthasia.*
2. 7th joint of mxp. 3 absent (palp 2-jointed) . . . . *Ostracotheres.*

Gen. Pinnotheres Bosc

1910. Stebbing, *l. c.*, p. 330.

1918. Rathbun, *l. c.*, p. 62.

1918. Tesch, *l. c.*, p. 247 (list of Indo-Pacific species, and key).

1926. Atkins, J. Mar. Biol. Assoc. Plym., n.s., xiv, p. 475, pls. 1–5 and 4 text-figs (sexual dimorphism, moulting).

1928. Lebour, J. Mar. Biol. Assoc. Plym., n.s., xv, p. 114, figs. (larval stages).

1931. Chopra, Rec. Ind. Mus., xxxiii, pp. 312–323.

1932. Shen, Zool. Sinica, ix, p. 131.

1933. Monod, Bull. Soc. Sci. Nat. Maroc., xii, p. 142 (dated 1932, but see Monod, *ibid.*, p. 218: publ. 1933).

1934. Gordon, Res. Sci. Ind. orient. Néerland, iii, fasc. 15, p. 19.

Carapace not well calcified, parchment-like, subcircular, margins convex and ill-defined, not up-turned, glabrous or pubescent, no longitudinal grooves. 3rd and 4th joints of mxp. 3 fused, oblique, palp 3-jointed (*i.e.* 7th joint present). Dactyls of legs not bifurcate.

Remarks.—No attention seems to have been paid to the 1st pleopod ♂, except by Shen and by Gordon. Gordon has also drawn attention (Proc. Linn. Soc. Lond., 149th sess., pt. 1, p. 29, 1937) to the asymmetry of the legs in some species.

Key to the South African Species.

1. Dactyls of 4th and 5th legs scarcely longer than those of 2nd and 3rd legs . . . . . *dofleini.*
2. Dactyls of 4th and 5th legs distinctly longer than those of 2nd and 3rd legs . . . . . sp. ?.

Pinnotheres dofleini Lenz

Fig. 16, *a–f.*

1904. Doflein, D. Tiefsee Exp., vi, p. 124, fig. 10, and pl. 37, figs. 3, 4, ♀ (*Pinnotheres* sp.).

1914. Lenz in Lenz and Strunck, D. Südpol Exp., xv, p. 281, pl. 12, figs. 17–19, ♂.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 241 (*ostrearius* part: the specimen from St. James).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 362.

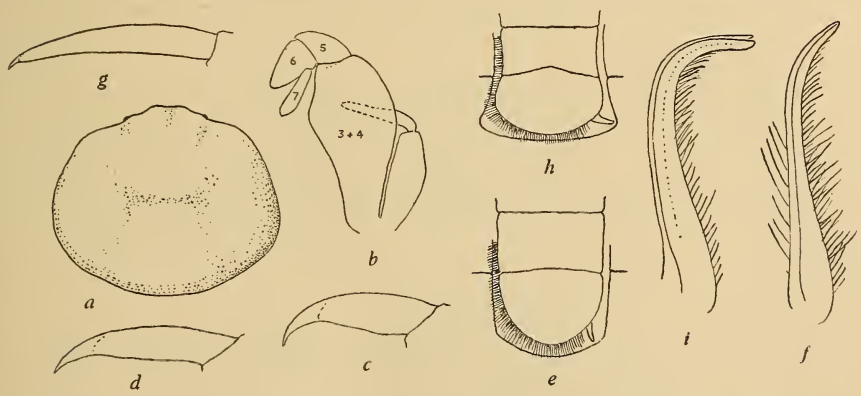


Fig. 16.—*Pinnotheres dofleini* Lenz. *a*, carapace. *b*, 3rd maxilliped. *c*, *d*, dactyls of 2nd and 5th legs. *e*, apex of abdomen ♂ in sternal groove, setae partly omitted to show apex of 1st pleopod. *f*, 1st pleopod ♂.
Pinnotheres sp. (Mossel Bay and Delagoa Bay). *g*, dactyl of 5th leg, ♀.
Pinnotheres ? pisum (Linn.)* (Europe). *h*, apex of abdomen ♂ in sternal groove, setae partly omitted to show apex of 1st pleopod. *i*, 1st pleopod ♂.

Carapace about $1\frac{1}{5}$ as broad as long, sparsely pilose, nearly or quite glabrous in ♀, hind margin gently convex. 7th joint of mxp. 3 inserted on proximal inner margin of 6th, and extending very slightly beyond apex of 6th, very slightly widened distally. Dactyls of 2nd

* Last abdominal segment does not correspond with Atkins' figures of ♂ *pisum* (*l. c.*, fig. 1 and pl. 1, fig. 2).

and 3rd legs subequal, of 4th and 5th also subequal but slightly longer than 2nd and 3rd, ungues strong. 3rd–5th legs stouter in ♂ than in ♀, 5th joints of 3rd–5th legs in ♂ fringed on hind margin. In ♂ sternal groove for reception of abdomen not laterally expanded on the segment between the chelipeds, and terminal segment of abdomen is not greatly broader than long (contrast *pisum*; fig. 16, *e* and *h*).

Length up to ♀ 16 mm., breadth 19 mm. Pale buff, sometimes with a pinkish tinge.

Localities.—Algoa Bay (Doflein); Simon's Bay, in the Ascidian *Phallusia canaliculata* (Lenz); St. James, False Bay, in the Ascidian *Pyura stolonifera* (Stebbing, coll. K. H. B.); Algoa Bay (S. Afr. Mus.); Simonstown among Ascidians on naval training ship in dry dock (coll. K. H. B.); False Bay, in large *Pinna*-shell (S. Afr. Mus.); Algoa Bay, in large *Pinna*-shell (Port Elizabeth Mus.).

Pinnotheres sp.

Fig. 16, *g*.

1920. Stebbing. *l. c.*, p. 241 (*pisum* ?, non Linn.).

1920. *Id.*, *ibid.*, p. 241 (*ostrearius* part: the Delagoa Bay specimen).

Carapace about $1\frac{1}{4}$ as broad as long, glabrous (♀), hind margin nearly straight. 7th joint of mxp. 3 inserted on proximal inner margin of 6th, scarcely reaching beyond apex of 6th, styliform, not widening apically. Dactyls of 2nd and 3rd legs subequal, of 4th longer, of 5th longer than 4th, those of 4th and 5th subcultrate or ensiform, slender with very small ungues.

Length, ♀ 8 mm., breadth 10 mm.

Localities.—Mossel Bay, in pearl-oyster (*Avicula*), and Delagoa Bay in shell of *Modiola* (Stebbing).

Remarks.—I have compared both Stebbing's specimens with European specimens of what I think is *pisum* (but see footnote to fig. 16), and the elongate dactyls of 4th and 5th legs at once distinguish the former.

Pinnotheres globosus Jacqu. & Lucas

1853. Jacquinot and Lucas, Voy. Astrolabe, Crust.

1853. Milne Edwards, Ann. Sci. Nat., xx, pl. 11, fig. 6.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 809.

1918. Tesch, *l. c.*, p. 257, footnote.

Locality.—Mozambique (Hilgendorf).

Distribution.—Singapore (Jacquinot and Lucas); New Caledonia (M. Edwards).

Remarks.—Tesch does not agree with M. Edwards in regarding this species as synonymous with *obesus* Dana.

Gen. Xanthasia White

1846. White, Ann. Mag. Nat. Hist., xviii, p. 176.
1887. de Man, J. Linn. Soc. Lond., xxii, p. 106.
1900. Alcock, *l. c.*, p. 340.
1918. Tesch, *l. c.*, pp. 245, 246.

Similar to *Pinnotheres* but the edge of the carapace is well defined, forming (except on fronto-orbital margin) an up-turned crest, thin or thickened. In the middle of the saucer-like dorsal surface a more or less mushroom-like tubercle or boss.

Remarks.—Alcock says the dactyl (7th joint) of mxp. 3 is wanting or represented by a tiny pencil of hairs; but Tesch includes the genus in his key under the heading of those genera, like *Pinnotheres*, in which the dactyl is present.

Xanthasia murigera White

1846. White, *l. c.*, p. 177, pl. 2, fig. 3.
1884. Miers, Zool. H.M.S. *Alert*, Crust., p. 546.
1894/5. Bürger, Zool. Jahrb. Abt. Syst., viii, p. 386, pl. 10, fig. 33.
1900. Alcock, *l. c.*, p. 341.
1918. Tesch, *l. c.*, p. 246.

Margin of carapace forming a thin up-turned and overhanging crest, ending in a curl on anterior part of the branchial regions. The median mushroom-like tubercle is reticulate; between it and the front 2 parallel crests. Dactyls of all legs short and subequal.

Length, ♀ 11·5 mm., breadth 15·5 mm.

Locality.—Mozambique, beach (Miers).

Distribution.—Philippines, Fiji, New Caledonia. Associated with *Tridacna*.

Remarks.—*X. whitei* de Man (1887, *l. c.*, p. 106, pl. 7, fig. 1), from Mergui, has a thickened, bolster-like carapace margin.

Gen. Ostracotheres M. Edw.

1910. Stebbing, *l. c.*, p. 330.
1914. Lenz and Strunck, D. Südpol Exp., xv, p. 283.

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 465.

1918. Tesch, *l. c.*, pp. 262.

Like *Pinnotheres*, but the palp of mxp. 3 only 2-jointed, *i.e.* the 7th joint is absent.

Ostracotheres tridacnae (Rüpp.)

1910. Stebbing, *l. c.*, p. 331.

1914. Lenz and Strunck, *l. c.*, pp. 282, 283.

1918. Tesch, *l. c.*, pp. 262 (in key), 287.

1924. Balss, Denkschr. Ak. Wiss. Wien., xcix, p. 14.

1938. Gurney, Proc. Zool. Soc. Lond., ser. B, cviii, p. 78, pl. 4, figs. 38–41 (larval stage).

Carapace subcircular, the front pubescent. Mxp. 3 pubescent on outer surface. Finger and thumb of chelipeds acute (not hollowed at tip). Dactyls of all legs subequal.

Length (according to Rüppell's figure) 15 mm.

Localities.—Natal (Krauss); Simon's Bay (Lenz and Strunck).

Distribution.—Red Sea.

Remarks.—Inhabits bivalve shells (*Tridacna*, *Pinna*).

Family OCYPODIDAE.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 485 (key to subfamilies).

1910. Stebbing, *l. c.*, p. 325.

1918 (January). Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 365.

1918 (February). Tesch, Siboga Exp. monogr., xxxix, *c.* p. 34.

1937. Tweedie, Bull. Raffles Mus., xiii, p. 140.

Orbits occupying whole of the anterior border except the front, which is usually narrow and deflexed, their outer rims often not well developed. Eye-stalks slender, often elongate. 5th joint of mxp. 3 articulating at or near the *external* apex of 4th joint; exopod usually slender and more or less concealed. One of the chelipeds (sometimes the right, sometimes the left) often vastly larger than the other in ♂. Abdomen of ♂ narrow. Genital openings ♂ sternal.

Remarks.—Littoral crabs, living on sandy or muddy shores, usually burrowing and gregarious.

Key to the South African Genera.

A. A cavity, with its edges thickly fringed with hairs, between bases of 3rd and 4th (2nd and 3rd walking) legs (*Ocypodinae*).

1. Carapace subquadrangular. Chelipeds very unequal in both sexes. Cornea very large, occupying greater part of ventral surface of eye-stalk . *Ocypode.*
2. Carapace broader than long. Chelipeds in ♀ small and subequal, in ♂ one vastly larger than other *Uca.*

B. No cavity between legs.

1. Body deep, more or less globose. Membranous spaces on 4th joints of the legs . . . *Dotilla.*
2. Body shallow, broader than long. No membranous spaces on legs (*Macrophthalminae*).
   a. Mxp. 3 not meeting, leaving a lozenge-shaped gap between them, 4th joint shorter than 3rd . . . . . *Macrophthalmus.*
   b. Mxp. 3 meeting in middle line, 4th joint as long as or longer than 3rd.
      i. 4th joint of mxp. 3 convex at antero-external corner, but not dilated. Cornea normal . . . . *Cleistostoma.*
      ii. 4th joint of mxp. 3 strongly dilated at antero-external corner. Cornea very small . . . . . *Tylodiplax.*

Gen. Ocypode Fabr.

Sand-crabs; Running-crabs.

1897. Ortmann, Zool. Jahrb. Abt. Syst., x, p. 359.

1910. Stebbing, *l. c.*, p. 325.

1915. Kemp, Mem. Ind. Mus., v, p. 218 (*Megalopa* and juv. of one species figured).

1918. Tesch, *l. c.*, p. 35 (*Ocypoda*).

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 418 (figs. 1st plp. ♂ of 3 species).

1940. Crane, Zoologica, xxv, p. 65 (development).

Body deep. Carapace subquadrangular, regions ill-defined, front deflexed. Eyes large, cornea occupying most of ventral surface of stalk which is often produced beyond the cornea like a horn. Chelipeds unequal in both sexes, the palm of the larger chela usually with a stridulating ridge of granules or striae, which can be scraped against a smooth polished ridge on the 3rd joint (the latter ridge is present on both chelipeds, but less developed on the smaller cheliped which has no palmar ridge; in those species where a stridulating ridge is absent, the ridge on 3rd joint is also absent). Legs strong; 5th (4th walking) pair weaker than others; dactyls fluted. A cavity, connecting with

the branchial chamber, between bases of 3rd and 4th legs, its edges fringed with long hairs. Abdomen of 7 segments in both sexes.

Remarks.—The Running-crabs are typical inhabitants of sandy beaches in tropical and subtropical regions. In South Africa the genus extends on the south coast as far west as Mossel Bay, but on the west coast has not been recorded farther south than Gt. Fish Bay (Tiger Peninsula) in Angola.

During the period of ebb-tide the crabs dig out their burrows; if surprised away from their burrows they run with extraordinary swiftness (see Stebbing, 1893, Hist. Crust., pp. 85 *sqq.*). For an account of the stridulating organ see Alcock, Ann. Mag. Nat. Hist. (6), x, 1892, p. 336. Crane (1940) shows that the peculiarities of the *Megalopa*-stage are adaptations to the habitat.

Key to the South African Species.

1. No stridulating ridge on palm. Eye-stalks not prolonged beyond cornea . . . . . *cordimanus.*
2. Stridulating ridge present.
   - *a.* Eye-stalks prolonged in a horn (at least in adult, not developed in juv.). Stridulating ridge extending across greater part of width of palm, composed of tubercles above and striae below . . . *ceratophthalmus.*
   - *b.* Eye-stalks not prolonged beyond cornea. Stridulating ridge occupying upper half only of width of palm, composed of tubercles . . . . . *kuhlii.*
   - *c.* Eye-stalks prolonged in a short conical process bearing a brush of hairs. Stridulating ridge extending across the palm, composed of striae . . . *cursor.*

Ocypode cordimanus Desm.

Fig. 17, *a*, *b*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 803.
1881. de Man, Notes Leyden Mus., iii, p. 248.
1897. Ortmann, *l. c.*, p. 362.
1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 349.
1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 110, pl. 15, fig. 2.
1910. Stebbing, *l. c.*, p. 326.
1912. Lenz, Ark. Zool., vii, no. 29, p. 6.
1915. Stebbing, Ann. S. Afr. Mus., xv, p. 58.
1918. Tesch, *l. c.*, p. 35.
1937. Chopra and Das, *l. c.*, p. 420, fig. 18 (1st plp. ♂).

Carapace widest in anterior third behind antero-lateral (external orbital) angles, which are acute and point forwards or slightly inwards. Eye-stalks without terminal prolongation. Lower border of orbit with a notch nearly in middle; outer border with a deep notch. Lower

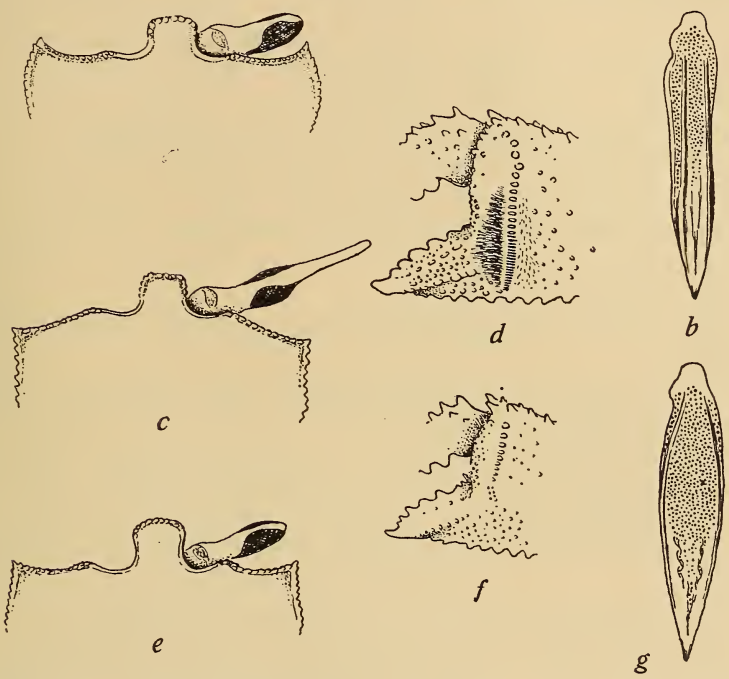


Fig. 17.—*Ocypode cordimanus* Desm. *a*, front of carapace. *b*, front view of dactyl of 2nd leg.
Ocypode ceratophthalmus (Pallas). *c*, front of carapace. *d*, stridulating ridge on inside of palm of larger chela.
Ocypode kuhlii de Haan. *e*, front of carapace. *f*, stridulating ridge on inside of palm of larger chela. *g*, front view of dactyl of 2nd leg.
(In *b* and *g* the dots represent sockets of hairs. In *d* and *f* the finger is not fully drawn in.)

margins of 4th joint, inner margin of 5th, and lower margin of 6th (hand) of chelipeds serrate; palm of larger chela with granules evenly disposed, no stridulating ridge; 3rd joint without a polished ridge, only a few granules and a polished apical knob. 6th joints of 2nd and 3rd legs more or less furry; dactyls (fig. 17, *b*) with the 2 keels on frontal surface subparallel, not concealing the lateral keels in front view. 5th segment of abdomen of ♂ distinctly broader than long (nearly twice).

Length up to 35 mm., breadth 40 mm.

Localities.—Natal (Krauss, Stebbing); Mozambique (Hilgendorf); Amanzemtoti, Natal (Lenz); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Mauritius; east coast of Africa to Red Sea, Indo-Pacific to Japan. Sometimes in fresh water (de Man).

Ocypode ceratophthalmus (Pallas)

Fig. 17, *c*, *d*.

1838. McLeay, Annulosa S. Afr., p. 64 (*cursor*, non Linn.).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 802.
1881. de Man, Notes Leyden Mus., iii, p. 245.
1894. Ortmann, Semon's Austral. Reise, v, p. 60.
1897. *Id.*, *l. c.*, p. 364.
1900. Alcock, *l. c.*, p. 345.
1902. de Man, Abh. Senckenb. Ges., xxv, p. 477, pl. 19, figs. 1, 1, *a* (chela).
1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 108, pl. 12, fig. 2 (growth of eyes).
1910. Stebbing, *l. c.*, p. 326.
1917. *Id.*, Ann. Durban Mus., ii, p. 11 (*urvillei* = juv.).
1918. Tesch, *l. c.*, p. 36.
1929. Cott, Proc. Zool. Soc. Lond., ii, p. 755, pl. 1, 1 text-fig. (habits).
1937. Chopra and Das, *l. c.*, p. 418, fig. 17, *a*, *b* (1st plp. ♂).
1947. Buitendijk, Zool. Med., xxviii, p. 281, fig. 1 (1st plp. ♂).

Carapace widest sometimes across the epibranchial area, sometimes across the antero-lateral angles, which are shortly acute and slightly turned outwards. Eye-stalks produced in a long styliform process beyond cornea, usually longer in ♂ than in ♀, but variable in both sexes; short in half-grown specimens, and quite undeveloped in juveniles. Upper orbital margin oblique, a line joining the outer orbital angles being well behind base of front; lower orbital margin with an indistinct notch in middle, no notch at outer orbital margin. Lower margins of 4th joints of chelipeds and legs, both borders of hand, and upper border of finger of chelipeds serrate; a single strong tooth on inner margin of 4th joint of chelipeds (often with smaller accessory teeth); palm of larger chela rather sparsely granulate, except near lower border, stridulating organ beginning above with a few rounded granules, followed by several rather widely spaced striae, and then more numerous close-set striae, the number of spaced and close-set striae variable, 14–20 and 15–30 respectively, that part of

the ridge occupied by striae being strongly furry in front; polished ridge on 3rd joint well developed, occupying at least half length of joint on larger cheliped, shorter on smaller cheliped. 6th joints of 2nd and 3rd legs furry; dactyls as in *cordimanus*, usually with strong fringe of hairs on anterior lateral margin. 5th segment of abdomen ♂ slightly broader than long.

Length up to 40 mm., breadth 45 mm. Milky- or greyish-white.

Localities.—Natal (Krauss, Kingsley); Mozambique (Hilgendorf); Port Elizabeth (Ortmann); Durban (Stebbing); Mossel Bay, Port St. Johns, Umkomaas, Scottburgh, Durban, Delagoa Bay, Chinde (S. Afr. Mus.).

Distribution.—Mauritius, east coast of Africa to Red Sea, Indo-Pacific.

Ocypode kuhlii de Haan

Fig. 17, *e–g*.

1838. McLeay, Annulosa S. Afr., p. 64 (*cordimana*, non Desm.).
1881. de Man, *l. c.*, p. 250.
1882. Miers, Ann. Mag. Nat. Hist. (5), x, p. 384, pl. 17, figs. 8, 8 *a*, *b*.
1894. Ortmann, Zool. Jahrb. Abt. Syst., vii, p. 761, pl. 23, fig. 19, *a*.
1894. Ortmann, Semon's Austral. Reise, v, p. 59.
1897. *Id.*, *l. c.*, pp. 359, 364.
1910. Stebbing, *l. c.*, p. 327.
1912. Lenz, Ark. Zool., vii, no. 29, p. 6.
1918. Tesch, *l. c.*, p. 36 (*kuhli*).
1933. Rathbun, Bull. Mus. Comp. Zool. Harv., lxxv, p. 260, pl. 7.
1934. Gordon, Res. Sci. Ind. orient. Néerland, iii, fasc. 15, p. 9 (*kuhli*).

Carapace widest across the epibranchial area, the antero-lateral angles directed outwards. Eye-stalks without terminal prolongation. Upper orbital margin not oblique, a line joining the antero-lateral angles at least as far forward as base of front; lower orbital margin with an obscure notch in middle; outer orbital margin deeply notched. Chelipeds and legs as in *cordimanus*, but hand of both chelipeds more elongate, its upper as well as lower margin serrate; palm of larger chela granulate, stridulating organ of 8–10 small round or ovoid tubercles situated in upper half of palm; polished ridge on 3rd joint occupying less than half length of joint, with a few granules proximally on smaller cheliped only a few granules and an apical polished knob

6th joints of 2nd and 3rd legs not furry; dactyls more expanded, but strongly depressed dorso-ventrally (fig. 17, *g*), the 2 frontal keels forming the lateral margins and concealing the true lateral keels in front view. 5th segment of abdomen ♂ 1½ times as broad as long.

Length up to 38 mm., breadth 45 mm. Milky- or greyish-white, junctions of the joints of chelipeds and legs often reddish.

Localities.—Natal (Kingsley, *ryderi*); Amanzemtoti, Natal (Lenz); Port Elizabeth (Ortmann); Port St. Johns, Scottburgh, Mozambique Is. (S. Afr. Mus.).

Distribution.—East coast of Africa, Indo-Pacific to Japan.

Remarks.—Tesch mentions an example with only 6–7 tubercles "placed irregularly in the *ventral* part of the (stridulating) organ" [italic mine].

A photograph of McLeay's specimen shows clearly that it is this species.

Ocypode cursor (Linn.)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 802.

1910. Stebbing, *l. c.*, p. 326.

1921. Rathbun, Bull. Amer. Mus. Nat. Hist., xliii, p. 461, pl. 52 (*ippeus*).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 23.

1927. Monod, Faune Col. franç. Cameroun, p. 609 (*hippeus*).

Carapace widest across the antero-lateral angles, which are directed outwards. Eye-stalks ending in a short conical process bearing a brush of hairs. Upper orbital margin transverse; lower border with slight median notch, outer orbital margin deeply notched. Upper margin of hand of chela not serrate; stridulating ridge formed of numerous fine striae; polished ridge on 3rd joint occupying more than half length of joint in larger cheliped, shorter in smaller cheliped. Lower surfaces of 6th joint of 2nd and 3rd legs strongly tuberculate, almost spinose, upper surfaces granulate but not furry; dactyls of 2nd and 3rd legs narrow ovate-lanceolate, those of 4th and 5th legs narrower; that of 3rd leg strongly furry on lateral and lower surfaces, that of 5th leg on its anterior margin only.

Length up to 44 mm., breadth 51 mm. (S. Afr. Mus.).

Locality.—Gt. Fish Bay, Angola (Doflein).

Distribution.—Mediterranean, west coast of Africa; Lobito Bay (S. Afr. Mus.), Port Alexander, Angola (Odhner).

Gen. Uca Leach

Fiddler-crabs; Boxer-crabs; Calling-crabs.

1814. Leach, Edin. Encycl., vii, p. 430.

1817. Latreille, Nouv. Dict. Hist. Nat., xii, p. 517 (*Gelasimus*).

1891. de Man, Notes Leyden Mus., xiii, p. 20 (*Gelasimus*) (key to Indo-Pacific species).

1910. Stebbing, *l. c.*, p. 327.

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 374.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 37.

1919. Kemp, Rec. Ind. Mus., xvi, p. 307, footnote (*Gelasimus*).

1922. Hyman, Ann. Rep. Smiths. Instit. for 1920, pp. 443 *sqq*, 6 pls. (habits, development).

1928. Maccagno, Boll. Mus. Zool. Turin, xli, no. 11, pp. 1–52, figs. (key).

1934. Gordon, Res. Sci. Ind. orient. Néerland, iii, fasc. 15, p. 10 (*Gelasimus*).

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 421 (*Gelasimus*).

1940. Crane, Zoologica, xxv, p. 72 (megalopa compared with that of *Ocypode*).

1941. *Id.*, *ibid.*, xxvi, p. 145, pls. 1–9, text-figs. 1–8 (W. coast American spp., morphology, habits).

1943. *Id.*, *ibid.*, xxviii, p. 217, fig. 1 (display, breeding).

Body deep. Carapace broader than long, regions ill-defined, front deflexed. Eyes terminal on long slender stalks. Chelipeds weak and subequal in ♀, finger and thumb apically spooned, in ♂ one of them enormously enlarged, no stridulating organ, smaller chela resembling those of ♀. Legs strong, dactyls fluted. A cavity, fringed with long hairs, between bases of 3rd and 4th legs. Abdomen with 7 segments in ♀, in ♂ with 7 or some of them coalesced.

Remarks.—Fiddler-crabs are gregarious on tropical and subtropical muddy shores and mangrove swamps. For the habits of these crabs see Alcock (1892, Ann. Mag. Nat. Hist. (6), x, p. 415), Stebbing (1893, Hist. Crust., pp. 89 *sqq.*), and Hyman (1922); Monod (1927, Fauna Colon. franç. Cameroun, p. 612, fig. 1) gives a picture of the ♂ and ♀ feeding.

The apparently numerous species of this genus, owing to a certain amount of variation, chiefly in the large chela of the ♂, have caused considerable taxonomic trouble, and it is only recently that the foundations for a correct discrimination of the species have been laid

by an examination of the 1st pleopods of the ♂♂. As Gordon (1934) has shown, this appendage has valuable taxonomic characters. Following up this line of investigation, I have figured the 1st pleopod ♂ of four species found in South Africa. In all these species the basal opening of the seminal channel is guarded by a setose flap on the inner side of the appendage. The apices, as will be seen from the figures, offer good specific characters (*cf.* Crane, *l. c.*, 1943, fig. 1).

The most southerly locality for Fiddler-crabs (*marionis* and *annulipes*) on the east coast, of which I have record, is 10 miles south of Port St. Johns, Pondoland; and on the west coast, St. Paul de Loanda.

Key to the South African Species (Males).

A. Front narrow (fig. 18, *a*, *d*).
  1. Inner margin of 4th joint of large chela with prominent acute tooth . . . . . *marionis.*
  2. Inner margin of 4th joint without tooth . . *urvillei.*

B. Front broad (fig. 18, *g*, *j*).
  1. Oblique ridge on lower part of palm of large chela ♂ absent. Finger of large chela with prominent subapical tooth . . . . . *inversa.*
  2. Oblique ridge present. No subapical tooth on finger.
    a. Upper border of hand of large chela with raised edge, and a groove on outer surface . . *chlorophthalmus.*
    b. Upper border of hand rounded.
      i. 4th joints of legs at least 3 times as long as broad . . . . . *lactea.*
      ii. 4th joints of legs less than 3 times as long as broad . . . . . *annulipes.*

The ♀♀ can be separated into species with narrow and species with broad fronts, but further specific characters seem to be lacking.

Uca marionis (Desm.)

Figs. 18, *a–c*, 19, *d*.

1880. Kingsley, Proc. Ac. Nat. Sci. Philad., pt. 1, p. 140, pl. 9, fig. 7 (*cultrimanus*), and p. 141, pl. 9, fig. 8 (*marionis*).

1891. de Man, Notes Leyden Mus., xiii, p. 23, pl. 2, figs. 5, 5, *a* (chelae) (*vocans*).

1902. *Id.*, Abh. Senckenb. Ges., xxv, p. 487 (synonymy).

? 1917. Stebbing, Ann. Durban Mus., ii, p. 15 (*arcuatus*, non de Haan).

1918. Tesch, *l. c.*, p. 38.

1920. McNeill, Rec. Austral. Mus., xiii, p. 105, figs. 1–5 and pl. 19 (typical form and vars.).

1921. Stebbing, Ann. Durban Mus., iii, p. 16 (*nitidus*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*vocans*).

1928. Maccagno, *l. c.*, p. 23, fig. 9, and p. 24, figs. 10, 11 (var. *nitida*).

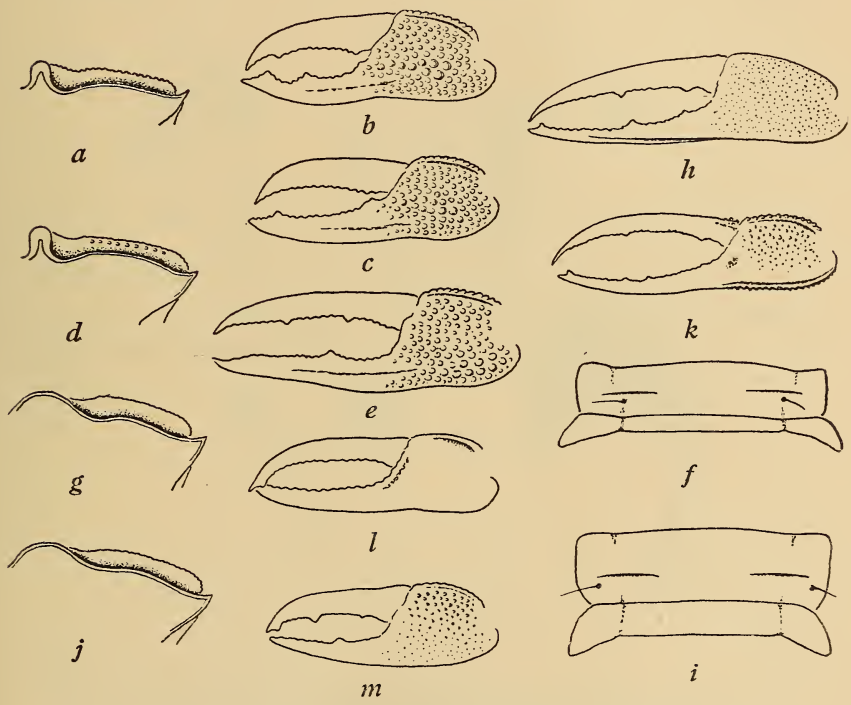


Fig. 18.—*Uca marionis* (Desm.). *a*, front of carapace. *b*, *c*, outer surface ♂ chela. *Uca urvillei* (M. Edw.). *d*, front of carapace. *e*, outer surface ♂ chela. *f*, 1st and 2nd abdominal segments ♂. *Uca annulipes* (M. Edw.). *g*, front of carapace. *h*, outer surface ♂ chela. *i*, 1st and 2nd abdominal segments ♂. *Uca chlorophthalmus* (M. Edw.). *j*, front of carapace. *k*, outer surface ♂ chela. *Uca inversa* (Hoffm.). *l*, inner view ♂ chela of *smithii* (after Kingsley). *m*, outer surface ♂ chela.

Front narrow. Lateral margins of carapace moderately convergent behind; no fine raised line defining the dorsal surface laterally except in front of epibranchial region. Lower border of orbit with a single row of crenulations. Large cheliped of adult ♂, 4th joint with upper margin distinct, and a prominent triangular tooth on inner margin, 5th joint with blunt spine on inner margin, hand with upper

and lower borders well defined, outer surface with large granules, inner surface with 2 prominent granulose ridges, thumb with a groove or line of pits on outer surface, cutting-edge simply sinuous, or with one or two triangular teeth, finger usually with one tooth on distal third of cutting-edge. Abdomen of ♂ with 7 segments, a transverse ridge across segment 1, segment 2 very short. 1st pleopod ♂, outer

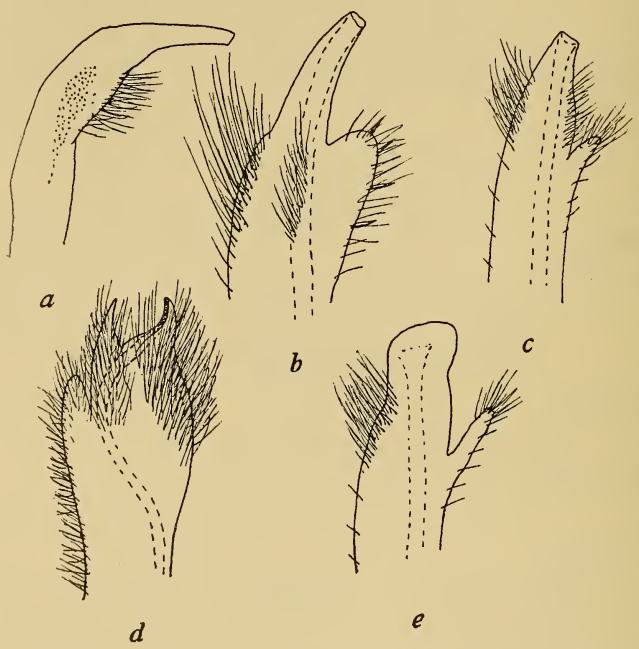


Fig. 19.—Left 1st pleopod ♂. In *a* viewed from outer side, in *b–e* from dorsal (concave) side, the internal (median) edge being on the right in *b–e*. *a, b, Uca urvillei* (M. Edw.). *c Uca chlorophthalmus* (M. Edw.). *d, Uca marionis* (Desm.). *e, Uca annulipes* (M. Edw.).

margin setose along whole length, apex trilobed, a small setose lobe on outside and 2 large lobes, the outer of which bears an acute process, and the inner one a broader channelled process, both these lobes strongly setose (only partly shown in figure), the seminal channel near apex crosses over to the outer side and then curves back again to open on the inside of the channelled process.

Length up to ♂ 16 mm., breadth 26 mm. Brownish orange, large chela ♂ pale orange below, purple above.

Localities.—Durban (Stebbing); Delagoa Bay (Barnard); mouth of Umgazana River, 10 miles S. of Port St. Johns (S. Afr. Mus.).

Distribution.—Mauritius (S. Afr. Mus.). Madagascar, east coast of Africa to Red Sea, Indo-Pacific, Queensland and New South Wales.

Remarks.—The lack of a demarcating line between the sides and the dorsum of the carapace, and the tooth of the 4th joint of the large cheliped ♂, distinguish this species from all other South African species.

The fact that Stebbing was inclined to include *vocans* M. Edw. (pl. 3, fig. 4), and his reference to the shape of the chela, seems to indicate that his material, or part of it, should be referred to *marionis* and not to *arcuata*.

The name *nitidus*, invoked by Stebbing (1921), is not available as it is preoccupied by Desmarest for a fossil species (Tesch, *l. c.*, p. 38).

This species seems to be rare in South Africa. At Delagoa Bay (Inyack Island) I found them in 1912 on sandy beaches; they were much shyer than the other species living in the mangrove swamps, and to capture them it was necessary to dig them out of their burrows. In front of the females the males raise themselves on the tips of their claws and then let themselves drop quickly, as if heaving a great sigh.

Uca urvillei (M. Edw.)

Figs. 18, *d–f*, 19, *a*, *b*.

? 1843. Krauss, Südafrik. Crust., p. 39 (*arcuatus*, non de Haan).

1852. Milne Edwards, Ann. Sci. Nat., xviii, p. 148, pl. 3, fig. 10.

1869. Hilgendorf, v. d. Decken's Reise, Crust., p. 84, pl. 4, fig. 1 (*dussumieri*, non M. Edw.).

1894. Ortmann, Semon's Austral. Reise, v, p. 59.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 362.

? 1905. Stebbing, Mar. Invest. S. Afr., iv, p. 40 (*arcuata*, non de Haan).

1910. *Id.*, *l. c.*, p. 327 (*arcuata*, non de Haan).

Front narrow, its groove narrower than the raised margin. Lateral margins of carapace strongly convergent behind; a fine raised line from the outwardly directed antero-lateral tooth to two-thirds distance to hind margin. Lower border of orbit crenulate, with an accessory row of granules within the margin. Large cheliped ♂, 4th and 5th joints without tooth or spine, hand with upper and lower borders well defined, outer surface with large granules, inner surface with the usual oblique and double granulate ridges, thumb grooved

on outer surface, cutting-edge with a single tooth near middle, finger with cutting-edge denticulate, a few of the denticles larger than the others, but no tooth near apex. Abdomen with 7 segments in ♂, 1st segment with a short transverse ridge on each side, interrupted medianly, with a seta in a pit behind it. 1st pleopod ♂ with distal expansion on inner margin, with spines and setae, apex strongly chitinised and curving dorsally, seminal channel opening apically.

Length up to ♂ 15 mm., breadth 26 mm. Greyish blue, large chela bright red (Krauss).

Localities.—Durban Bay (Krauss, Stebbing); Durban Bay and Delagoa Bay (S. Afr. Mus.).

Distribution.—East coast of Africa, Madagascar, Madras, Nicobars, Mergui, Vanicoro.

Remarks.—*U. dussumieri* and *urvillei* are very closely allied species, the latter being distinguished by the accessory row of granules on lower orbital border. But de Man (1891) has recorded specimens showing traces of this accessory row, which in other respects (shape of carapace) resemble typical *dussumieri*. The fine raised dorso-lateral lines converge more rapidly in *urvillei* than in *dussumieri*. As the South African specimens have the accessory row of granules quite distinct, and the 1st pleopod ♂ unlike that figured by Gordon (1934) for *dussumieri*, they are assigned to *urvillei*.

This form is in all probability that which Krauss and Stebbing assigned to *arcuata*, a species which does not seem to exist in the western portion of the Indian region.

Uca inversa (Hoffm.)

Fig. 18, *l*, *m*.

1874. Hoffmann, Crust. . . . Madag, Réunion, p. 19, pl. 4, figs. 23–26.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 803 (*chlorophthalmus*, non M. Edw.).

1880. Kingsley, *l. c.*, p. 144, pl. 9, fig. 14 (chela) (*smithii*).

1891. de Man, *l. c.*, p. 44, pl. 4, fig. 12 (chela).

1894. Ortmann, Semon's Austral. Reuse, v, p. 59.

1900. Alcock, *l. c.*, pp. 355, 356 (var. *sindensis*).

1910. Stebbing, *l. c.*, p. 328.

1928. Maccagno, *l. c.*, p. 26, fig. 13.

1942. Chace, Bull. Mus. Comp. Zool. Harv., xci, p. 202.

Front broad. Lateral margins strongly convergent behind. Lower orbital margin (seen from above) slightly concave in middle, not crenulate except at external rounded angle, no accessory row of granules. Large cheliped ♂, 4th joint with upper outer margin dilated into a denticulate crest, 5th joint with inner margin denticulate, hand with upper margin separated from outer surface by a row of granules, outer surface granulate above, smooth (minutely granulate) below, lower margin granulate, palm without the oblique ridge found in other species, only the double transverse granulate ridge near the finger-hinge, thumb not grooved on outer surface, cutting-edge with a tooth just before middle, finger with a tooth immediately behind apex, and sometimes a second one a little farther back.

Localities.—Natal (Kingsley); Mozambique (Hilgendorf).

Distribution.—Madagascar, E. coast of Africa, Red Sea.

Remarks.—Although Kingsley placed his species *smithii* in the narrow-fronted group, Ortmann has identified it with *inversa* (? after inspection of Kingsley's type); Kingsley's brief description is not inconsistent, barring the width of the front.

Uca chlorophthalmus (M. Edw.)

Figs. 18, *j*, *k*, 19, *c*.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 484, pl. 19, fig. 4.

1910. Stebbing, *l. c.*, p. 327.

1942. Ward, Mauritius Inst. Bull., ii, p. 104.

[Not *chlorophthalmus* McLeay 1838, nor Hilgendorf 1869 and 1878.]

Front broad. Lateral margins strongly convergent behind, antero-lateral angles very acute, directed obliquely outwards. Upper orbital margin rather oblique; lower orbital margin without accessory row of granules. Large cheliped ♂, outer surface of 4th joint somewhat squamose, upper margin somewhat granulate, upper border of hand margined with a raised granulate edge, with groove on its outer side, outer surface finely granulate, the granules slightly larger in the upper part, sometimes a shallow furry depression near base of thumb (*cf.* Tesch, *l. c.*, p. 40), inner surface of palm with the usual oblique granulate ridge, and 2 rather widely separated rows of granules near finger-hinge, the distal row continued more or less on to base of thumb, the more proximal row sometimes feeble, or reduced to 4–5 granules, lower edge granulate, with groove on outer side, but groove

not extending on to base of thumb, the latter not grooved on outer surface, cutting-edge with 2–4 teeth, the most distal one just before tip, finger not grooved on outer surface, only a short groove basally near upper edge, where there are a few granules, cutting-edge with 2–3 teeth. Abdomen ♂ with 7 segments, 5th segment 1½ times as broad as long, and slightly longer than either 4th or 6th (*cf.* de Man, 1888, *triangularis*). 1st pleopod ♂ distally with digitiform process on inner margin, apex truncate conical, the seminal channel opening apically.

Carapace bluish grey with paler mottling, large chela ♂ red, finger and thumb paler.

Localities.—Isipingo, Natal (Stebbing); Durban Bay, Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius; East Indies.

Remarks.—Stebbing remarked that this species could not be included in the South African fauna-list merely on McLeay's record. In fact, McLeay's specimen is now proved (by photograph) to be *annulipes*.

The specimens above described, however, appear to be this species, or possibly *gaimardi*. de Man (1891, p. 42) separates these two species on the shape of the hand of the large chela ♂ (length including finger and thumb 2½ times the width in *chlorophthalmus*, 3 times in *gaimardi*). But the South African Museum specimens, otherwise identical, exhibit both "long" and "short" hands. Tesch (*l. c.*, p. 40, under *gaimardi*) makes the same observation, and doubts whether the two species are really distinct. The name *chlorophthalmus* has priority.

This species is easily distinguished from the other South African species; it is not *triangularis* as the finger of large chela is not grooved, and there are 2 (albeit variable in development; *cf.* de Man, 1891, p. 43) rows of granules on palm near the finger-hinge.

Uca lactea (de Haan)

1910. Stebbing, *l. c.*, p. 327.

1917. *Id.*, Ann. Durban Mus., ii, p. 16, pl. 4.

1928. Maccagno, *l. c.*, p. 29, fig. 15.

Front broad. Lateral margins nearly parallel, antero-lateral angles directed forwards. Lower orbital margin slightly convex, crenulate along whole margin, without accessory row of granules. Large cheliped ♂, upper outer margin of 4th joint somewhat granulate, upper surface of hand rounded, outer surface finely granulate above,

smooth (minutely granulate) below, lower border very finely granulate, palm with the usual oblique ridge near finger-hinge, outer surface of thumb without furrow near lower border, cutting-edge with a tooth just before middle, and slightly arcuate immediately before tip, which is never notched-truncate, finger with a tooth just before middle, but no tooth near tip. 4th joints of walking legs not strongly expanded, 3 to nearly 4 times as long as wide.

Sky-blue with greenish brown, or blackish blue with pale grey mottling, large chela bright red (Krauss).

Locality.—Durban Bay (Krauss, Stebbing).

Distribution.—India, East Indies, China, Japan.

Remarks.—Stebbing's figure of the chela shows a groove near lower margin of thumb and thus conflicts with de Man's statement (1891, p. 45); but the 4th joints of the legs appear to be narrow, this being the only character Stebbing indicates in support of his identification. The presence of this species in South Africa requires confirmation.

Uca annulipes (M. Edw.)

Figs. 18, *g–i*, 19, *e*.

1838. McLeay, Annulosa S. Afr., p. 64 (*chlorophthalmus*, non M. Edw.).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 803.

1884. Miers, Crust., H.M.S. *Alert*, p. 541.

1887. de Man, J. Linn. Soc. Lond., xxii, p. 118, pl. 8, figs. 5–7 (chelae) (*Gelasimus a.*).

1894. Ortmann, Semon Austral. Reise, v, p. 59.

1915. Kemp, Mem. Ind. Mus., v, p. 221.

1917. Stebbing, Ann. Durban Mus., ii, p. 16 (references).

1928. Maccagno, *l. c.*, p. 35, fig. 20, and var. *orientalis*, p. 36, fig. 21.

1934. Gordon, *l. c.*, p. 10.

Front broad. Lateral margins convergent behind, antero-lateral angles directed obliquely outwards. Lower orbital margin crenulate along whole length, with accessory row of granules in ♀ only, not in ♂. Large cheliped ♂, upper surface of 4th joint feebly and sparsely granulate, upper surface of hand rounded, whole outer surface smooth (minutely granulate), lower border not granulate, palm with the usual oblique ridge and double ridge near finger-hinge, thumb grooved near lower margin on outer surface, cutting-edge with 3–4 teeth, the distal subapical one sometimes strongly developed (var. *orientalis*), some-

times the edge merely arcuate at this place (de Man, 1887, pl. 8, fig. 7), finger with 2–4 teeth, but no enlarged tooth just before tip, sometimes without any enlarged teeth (de Man, pl. 8, fig. 7). Walking legs rather strongly expanded, not 3 times as long as wide. Abdomen of ♂ with 7 segments, 1st segment usually with an obscure transverse ridge on either side, interrupted medianly, with a seta in a pit behind it and near the outer margin, 5th segment twice as broad as long, slightly longer than 4th and subequal in length to 6th. 1st pleopod ♂ distally with digitiform process on inner margin, apex flattened, and rather broadly spatulate, the seminal channel opening subapically on the ventral (convex) side.

Length up to ♂ 11 mm., ♀ 9 mm., breadth ♂ 20 mm., ♀ 16 mm. Carapace blackish, or bluish black, with milk-white mottling, legs reddish, large chela salmon.

Localities.—Inhambane and Mozambique (Hilgendorff); mouth of Zambesi River (Miers); Durban (Miers, Stebbing); Durban, Delagoa Bay, Inhambane, and mouth of Umgazana R., 10 miles S. of Port St. Johns (S. Afr. Mus.).

Distribution.—East coast of Africa, Madagascar, Seychelles, Indo-Pacific.

Remarks.—This seems to be the commonest species in South Africa. It inhabits muddy shores and mangrove swamps. Boyce (1924, S. Afr. J. Nat. Hist., iv, p. 250) has given a popular account of its habits.

Gen. Dotilla Stimpson

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 363.
1910. Stebbing, *l. c.*, p. 329.
1917. *Id.*, Ann. Durban Mus., ii, p. 17.
1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 43 (key to species).
1919. Kemp, Rec. Ind. Mus., xvi, p. 324.
1940. Ramadan, Ann. Mag. Nat. Hist. (xi), 5, p. 253 (zoea stage).

Body deep, subcubical or subglobose. Carapace as broad as, or broader than long, dorsal and lateral surfaces sculptured with convoluted grooves; front narrow, deflexed. Eye-stalks long, cornea terminal. Buccal cavity and mxp. 3 very large, 4th joint of latter sculptured with convoluted grooves; penultimate joint of endopod of mx. 2 greatly expanded. Chelipeds equal in both sexes, finger and thumb slender, acute. 4th joints of chelipeds and legs with oval membranous spaces (tympana or "windows"); similar spaces sometimes also on some of the sternites. Abdomen with 7 segments

in both sexes, hind margin of 4th segment thickly fringed with setae, 5th segment not constricted in ♂. No brushes of hairs between bases of any of the legs.

Remarks.—Easily recognized among South African genera by the tympana or "windows" on the legs (see Kemp, 1918, Mem. Asiat. Soc. Bengal, vi, p. 228). Gregarious on muddy and sandy shores. For remarks on the sexes, and dimorphism, see Kemp (*l. c.*, 1919, pp. 324, 331 *sqq.*).

Dotilla fenestrata Hilg. 1869.

Fig. 20, *a*, *b*.

1843. Krauss, Südafr. Crust., p. 30 (*Doto sulcatus*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 806.
1904. Doflein, D. Tiefsee Exp., vi, p. 128.
1910. Stebbing, *l. c.*, p. 329.
1917. *Id.*, *l. c.*, p. 18, pl. 5 (*clepsydra*).
1919. Kemp, *l. c.*, p. 327 (references).
1921. Bigalke, S. Afr. J. Nat. Hist., iii, p. 205 (habits).
1934. Balss, Faune Col. Franç., v, p. 521 (var.).
1941. Gordon, Proc. Linn. Soc. Lond., 153 Sers., pt. 1, p. 136, fig. 11, *a* (plp. 1 ♂).

Carapace broader than long, smooth grooves in shape of a 5-rayed star, median anterior one continued to apex of front, antero-lateral ones directed towards middle of orbital margin, postero-lateral ones towards but not reaching postero-lateral angles above insertion of 5th legs; behind the latter grooves a **V**-shaped groove enclosing a triangular space which is pitted or feebly granulate and without cardiac grooves; hind margin straight; a lateral groove from base of 5th leg, anteriorly bifurcate, outer branch of the fork running to the short antero-lateral projection which bears a tuft of setae; rest of carapace finely granulate. Sternal tympana on 2nd and 3rd segments, sometimes also on the 1st (cheliped segment) and 4th segments, sometimes asymmetrically developed. Cheliped with a spiniform or digitiform process on under side near base of the joint in ♂, small in juv. and ♀; finger and thumb longer than palm, each with a tooth on inner edge. 1st pleopod ♂ rather slender, sinuous, distal quarter curving rather sharply outwards, outer margin setose except distally, apex slightly hooked, with a subapical fringe of plumose setae on inner anterior margin.

Length ♂ 10 mm., breadth 13 mm. Pale yellowish, with slightly darker markings on carapace.

Localities.—Durban Bay (Krauss, Stebbing, Gordon); Inhambane (Hilgendorf); Mozambique (Hilgendorf, Miers, Gordon); Durban,

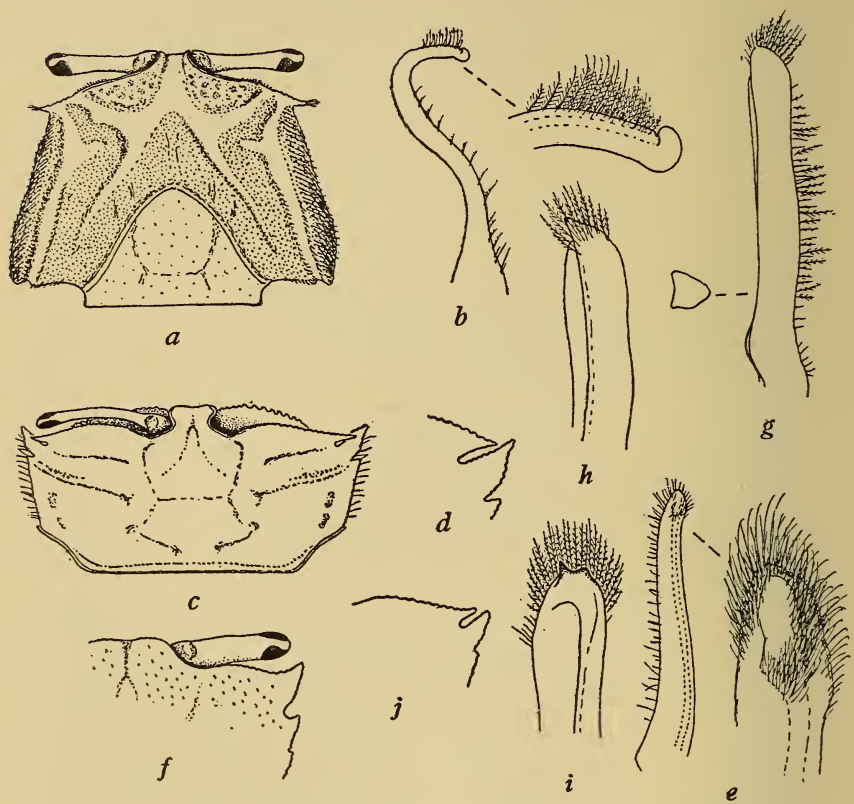


Fig. 20.—*Dotilla fenestrata* Hilg. *a*, carapace. *b*, 1st pleopod ♂, with apex further enlarged.
Macrophthalmus grandidieri M. Edw. *c*, carapace ♂. *d*, part of carapace ♀. *e*, 1st pleopod ♂, with apex further enlarged.
Macrophthalmus boscii Aud. *f*, part of carapace. *g*, *h*, *i*, ventral, median, and dorsal views respectively of 1st pleopod ♂, with cross-section.
Macrophthalmus hilgendorfi Tesch. *j*, part of carapace (after Tesch).

Delagoa Bay, Inhambane, Beira, Chinde, Mozambique (S. Afr. Mus., coll. K. H. B. 1912).

Distribution.—Ibo; Zanzibar, Dar-es-Salaam and Mombasa; Madagascar.

Remarks.—Farther north this species is replaced by the closely

allied *sulcata* (Forskal), which is distinguished by having no sternal tympana and no teeth on the inner edges of finger and thumb of chelipeds.

Gen. Macrophthalmus Latr.

1915. Tesch, Zool. Med. Mus. Leiden, i, pp. 149–204.
1917. Stebbing, Ann. Durban Mus., ii, p. 12.
1918. Tesch, Siboga Exp. monogr., xxxix *c*, pp. 57, 58.
1919. Kemp, Rec. Ind. Mus., xvi, pp. 383–394.

Body shallow. Carapace broader than long, regions well defined, cervical and branchial grooves defining two teeth on lateral margin. Front relatively narrow, deflexed. Eye-stalks slender, elongate, sometimes extending beyond lateral margins of carapace, cornea terminal. Buccal cavity and mxp. 3 rather large, 3rd and 4th joints of latter not quite meeting in middle line, leaving a lozenge-shaped gap. Chelipeds equal or subequal, but much enlarged in ♂, short and feeble in ♀, finger and thumb bent inwards. 3rd legs longest and stoutest, 2nd and 5th short, the latter shortest. No brushes of hairs between bases of any of the legs. Abdomen with 7 segments in both sexes.

Remarks.—Kemp points out that the genus *Euplax* cannot be precisely defined until the rediscovery of its type species, and that the species *boscii* mentioned below might legitimately be retained in *Macrophthalmus*, where its original author, and also Krauss, placed it.

Key to the South African [*Mauritian, etc.*] *Species* (*after Tesch* 1915).

A. Carapace about twice as broad as long. Outer surface of hand ♂ with a ridge near lower margin, inner surface (palm) with a spine.
  1. External orbital tooth and 1st lateral tooth on carapace crossed, or nearly at right angles to one another (fig. 20, *c*, *d*).
    a. Eye-stalks extending slightly beyond sides of carapace . . . . . [*sulcatus*, Mauritius].
    b. Eye-stalks scarcely reaching inner margin of 1st lateral tooth . . . . . *grandidieri*.
  2. External orbital tooth and 1st lateral tooth pointing approximately in same direction (fig. 20, *j*).
    a. Length of hand ♂ chela (without thumb) 4 times as long as high. Carapace with verrucose tubercles laterally . . . . . [*brevis*, Mauritius].

b. Length of hand (without thumb) about twice as long as high. Carapace without verrucose tubercles . . . . . *hilgendorfi.*

B. Carapace less than twice as broad as long, conspicuously granulate. Inner surface (palm) of hand of ♂ chela without spine.

1. 4 lateral teeth, incl. external orbital tooth [*latreillei*, Madagascar, etc.].
2. 2 lateral teeth . . . . . *boscii.*

Macrophthalmus grandidieri M. Edw.

Fig. 20, *c–e.*

1915. Tesch, *l. c.*, p. 166, pl. 6, figs. 3, 3, *a*, *b* (references).
1917. Stebbing, *l. c.*, p. 12, pl. 3.
1934. Balss, Faune Col. Franç., v, p. 522.
1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 148, fig. 27.

Carapace finely granulate, rather more strongly so laterally where there are sometimes 2 feebly raised patches of granules on the branchial region, and a transverse ridge immediately in front of the branchial groove. Supra-orbital margin rather strongly sinuous. External orbital angle (tooth) directed outwards and meeting or overlapping, at least in ♂, the larger 1st lateral tooth, which points obliquely forwards and outwards. A second, smaller, lateral tooth present. Eye-stalks not reaching beyond inner margin of 1st lateral tooth. Cheliped ♂, a conical tooth on inner surface of 5th joint, and one on inner surface of hand near base, both often with subsidiary denticles; upper margin of hand denticulate, a beaded or corded ridge on outer surface near lower margin, continued as a faint smooth ridge along the thumb, lower margin of hand and thumb granulate; thumb with oblong denticulate tooth on middle of inner margin, finger with a similar tooth at base, upper margin granulate; finger and thumb strongly gaping, the distal width of hand about $1\frac{2}{3}$ in length of upper margin of hand; in ♀ finger and thumb less gaping, inner margins finely denticulate. 1st pleopod ♂ slightly sinuous and tapering, seminal canal opening into an apical cavity on dorsal side of appendage, fringed with golden setae, a fine line (or suture) along inner edge of appendage, outer edge setose.

Length up to ♂ 16 mm., ♀ 11 mm., breadth ♂ 33 mm., ♀ 21 mm.

Localities.—Durban (Stebbing); Durban Bay, Delagoa Bay, Mozambique (S. Afr. Mus.).

Distribution.—Zanzibar, Dar-es-Salaam, Kilwa, Red Sea, Madagascar.

Remarks.—The crossing of the two antero-lateral teeth appears to take place only in the ♂; in young ♂ the external orbital tooth, just touches, and even in some adult ♂♂ does no more than just touch, the 1st lateral tooth; in the ♀ there is a distinct but narrow gap between the two teeth.

Macrophthalmus hilgendorfi Tesch

Fig. 20, *j*.

1851. Bianconi, Spec. Zool. Mosamb., fasc. 5, p. 85 (*carinimanus*, non M. Edw.).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 806 (*carinimanus*, non M. Edw.).

1915. Tesch, *l. c.*, p. 172, pl. 7, figs. 6, 6, *a*, *b* (references).

1934. Balss, Faune Col. Franç., v, p. 522 (as syn. of *grandidieri*).

Carapace finely granulate, without raised patches of granules (verrucose tubercles) laterally. External orbital tooth and 1st lateral tooth pointing approximately in same direction obliquely forwards; 2nd lateral tooth very feeble. Eye-stalks as in *grandidieri*. Cheliped ♂ as in *grandidieri*.

Length up to 15 mm., breadth 32 mm.

Locality.—Mozambique (Bianconi, Hilgendorf); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Zanzibar, Red Sea, Madagascar.

Remarks.—I have seen only one ♀, from Delagoa Bay; my Mozambique specimens being definitely referable to *grandidieri* as regards the character of the two antero-lateral teeth. It would seem as if the species is not too well characterized, and Balss definitely regards it as a synonym of *grandidieri*. Possibly the 1st pleopod ♂ would provide better differential characters, but this appendage does not appear to have been studied in this genus.

Macrophthalmus boscii Audouin

Fig. 20, *f–i*.

1843. Krauss, Südafrik. Crust., p. 40, pl. 2, fig. 5, *a–c*.

1910. Stebbing, *l. c.*, p. 329 (*Euplax b.*).

1915. Tesch, *l. c.*, pp. 188, 192, 193 (*Euplax b.*).

1918. Stebbing, Ann. Durban Mus., ii, p. 55 (*Euplax b.*) (references).

1918. Tesch, *l. c.*, p. 60 (*Euplax b.*) (references).

1919. Kemp, *l. c.*, pp. 384, 391, pl. 24, fig. 6.

1938. Balss, Medd. Göteb. Mus., lxxv, p, 76.

Carapace subquadrangular, slightly broader than long, granulate, regions defined by pilose grooves, lateral margins setose, with 2 anterolateral teeth, outer margins of 1st or external orbital teeth convergent behind, *i.e.* greatest width of carapace between tips of these teeth; 3rd tooth practically obsolete. Eye-stalks a little longer than $\frac{1}{3}$ breadth of carapace. Gap between 3rd maxillipeds a little wider than in other species of the genus. Hand of cheliped not greatly widened distally, granulate ridge on outer surface very faint, finger with tooth near base, cutting-edge of thumb crenulate; in ♂ inner surfaces of joints of chelipeds, including finger and thumb, thickly furred. Legs setose and fringed with hairs. 6th segment of abdomen ♂ slightly wider than 5th segment.

Length up to 14·5 mm., breadth 21 mm., ovig. ♀ 9 × 12 mm. Yellowish with white hairs (Krauss and K. H. B.); chelae of ♂ white on outer surface (Tesch); whitish or greyish, scattered red specks and dots on carapace and walking legs, chelae ♂ white, pterygostomial regions and anterior margin of buccal cavity more or less reddish (East London specimen, preserved in formalin).

Localities.—Natal (Krauss): Mozambique (Miers); Durban Bay (Stebbing); Delagoa Bay (coll. K. H. B. 1912); East London and Port Alfred (coll. T. A. Stephenson).

Distribution.—Madagascar, Red Sea, east coast of Africa, Malaysia, Oceania.

Gen. Cleistostoma de Haan

1910. Stebbing, *l. c.*, p. 328.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 61, and *Paracleistostoma*, p. 62.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 239.

1924. *Id.*, *ibid.*, xix, p. 3.

1926. Rathbun, Rec. Austral. Mus., xv, p. 178.

1931. Gordon, J. Linn. Soc. Lond., xxxvii, figs. 26–28 (1st pleopod ♂ of 3 species).

1932. Shen, Zool. Sinica, ix, p. 231 (*Paracleistostoma*) and p. 236 (figs. 1st plp. ♂ of 2 species).

1937. Tweedie, Bull. Raffles Mus., no. 13, pp. 157–160 (figs. 1st pleopod ♂ of 2 species).

Body shallow. Carapace broader than long, strongly vaulted (*Cleistostoma*) or rather flattened (*Paracleistostoma*), regions not well defined, lateral margins entire or with one tooth; front deflexed, its antero-lateral corners rounded (*Cleistostoma*) or angular and more or less produced (*Paracleistostoma*). Eye-stalks not very long, rather stout, cornea well developed, terminal. 3rd maxillipeds meeting in middle line, 4th joint as long as or longer than 3rd. Chelipeds stout in ♂, weak in ♀, 3rd and 4th legs strongest. No brushes of hairs between any of the legs. Abdomen with 7 segments in both sexes.

Key to the South African Species.

1. Antero-lateral corners of carapace sharp, tooth-like . *edwardsii.*
2. Antero-lateral corners rounded (♀) with small blunt point (♂) . . . . . *edwardsii* var.

Cleistostoma edwardsii McLeay

Fig. 21, *a–g.*

1838. McLeay, Annulosa S. Afr., p. 64 (*Cleistotoma* [sic] *e.*).

1843. Krauss, Südafrik. Crust., p. 40 (*Cleistotoma* [sic] *e.*).

1910. Stebbing, *l. c.*, p. 328.

1939. Buitendijk, Zool. Medd., xxii, p. 76, figs. 1–5 (carapace, chela ♂♀, mxp. 3, abd., 1st plp. ♂).

Carapace quadrangular, sparsely setose, but more closely setose in the shallow grooves and hollows and on lateral margins, 1st antero-lateral (external orbital) tooth sharp, curving slightly inwards, behind it one distinct tooth and an obscure (especially so in ♀) notch, carapace widest anteriorly in ♂ posteriorly in ♀. Antero-lateral corners of front quadrate. Supra- and infra-orbital margins minutely granulate in ♀ obscurely so in young ♂, and smooth in adult ♂. Eye-stalks stout, not tapering, with a few hairs in adult ♂, cornea well developed. 3rd maxillipeds close together in middle line, 4th joint subequal to 3rd, antero-external margin somewhat strongly convex in adult ♂, exopod concealed. Anterior margin of buccal cavity somewhat sinuous, but not strongly bilobate. Cheliped ♂ robust, smooth, a row of very small granules on upper margin of hand, finger with squarish tooth (relatively smaller in adult than in young) near base, apex curved, granulate, thumb distally with a groove, bordered on inner and outer side by a denticulate ridge into which the finger apex fits, in young ♂ the inner ridge is not developed; in ♀ very weak (see fig. in Buitendijk). Legs

furry, and with fringes of longer whitish setae, 4th leg longest, 2nd and 5th shortest, dactyls flattened, fringed on both margins. Abdomen in ♂ evenly tapering, except that the lateral margins of 5th segment are concave to allow the protrusion of the folded 1st pleopods.

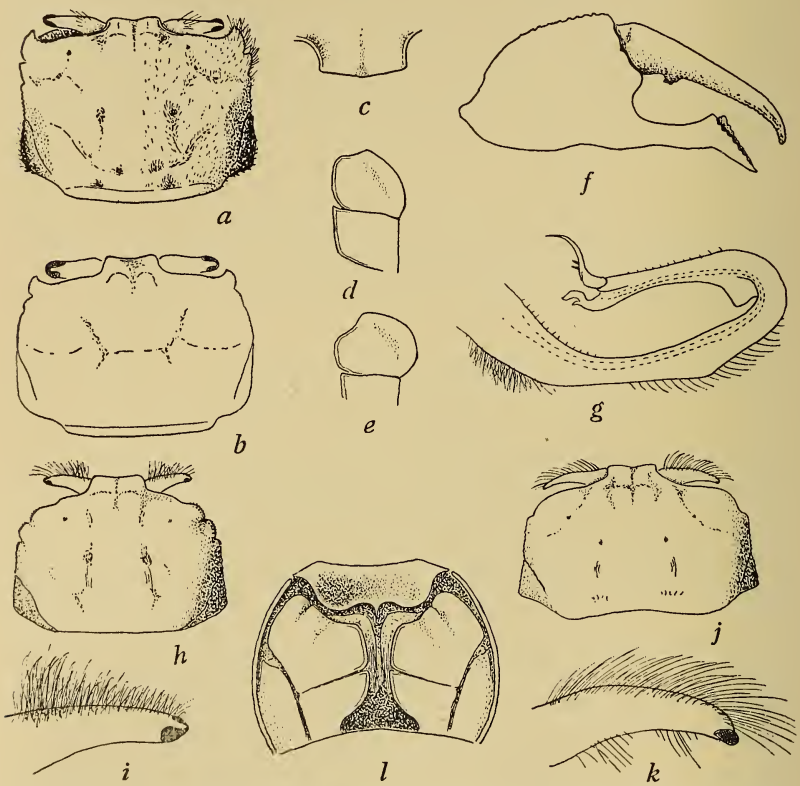


Fig. 21.—*Cleistostoma edwardsii* McLeay. *a*, carapace ♂. *b*, carapace ♀. *c*, frontal view of front. *d*, *e*, 3rd and 4th joints of mxp. 3 of smaller and larger ♂ respectively. *f*, chela ♂. *g*, 1st pleopod ♂.
Cleistostoma edwardsii var. *h*, carapace ♀. *i*, eye, dorsal view ♀.
Tylodiplax blephariskios (Stebb.). *j*, carapace ♀. *k*, eye, ventral view. *l*, episstome and 3rd maxillipeds.

Length up to ♂ 9 mm., non-ovig. ♀ 6 mm., breadth ♂ 11 mm., ♀ 8 mm.; one ovigerous ♀ 5·5 × 7 mm.

Localities.—Knysna (Buitendijk, and S. Afr. Mus.); estuary of Buffalo River, East London (coll. T. A. Stephenson).

Remarks.—Mr. Melbourne Ward tells me (4/3/37) that the type of this species is not amongst the McLeay collection of South African Crustacea in the Australian Museum.

Buitendijk gives a brief description with useful figures, including one of the 1st pleopod ♂. The crenulation of the carapace margin in his figure is a little too strong. The shape of the front varies according to the angle from which it is viewed; it may be quite straight.

Cleistostoma edwardsii var.

Fig. 21, *h*, *i*.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 239 (*leachii*) (not the references to McLeay, Krauss, or Stebbing, 1910).

Stebbing's ovigerous ♀ and a single ♂ from an unknown locality (ex s.s. *Pieter Faure* coll.) differ only from the normal *edwardsii*, as above described, in the following particulars.

Carapace and legs more densely setose than in any specimen of *edwardsii* that I have seen, especially on the margin of the carapace and on the legs in the ♂. External orbital corner with a very small blunt point in ♂, but quite rounded in ♀. Eye-stalks stout, but tapering distally, cornea considerably smaller than in typical *edwardsii*, but partly visible in dorsal view.

1st pleopod ♂ exactly similar to that of typical *edwardsii*.

Length 8 mm., breadth 10 mm.

Locality.—Zwartkops River estuary, Port Elizabeth. 1 ovig. ♀ (Stebbing); 1 ♂ without locality (S. Afr. Mus.).

Remarks.—The similarity of the 1st pleopod ♂ would seem to be against the institution of a separate species, though the denser setose fringes of the carapace and legs, and especially the character of the eye-stalks and cornea, are distinctive features.

Gen. Tylodiplax de Man

1895. de Man, Zool. Jahrb. Abt. Syst., viii, p. 598.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 373.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p 69.

Body shallow. Carapace broader than long, dorsally flat, lateral borders divergent posteriorly, regions more or less defined, front not or not strongly deflexed. Eye-stalks not very long, cornea very small. Epistome with a fold on each side, causing the anterior margin of buccal cavity to appear bilobed. 3rd maxillipeds meeting in middle line except basally, 4th joint longer and wider than 3rd, antero-

external corner strongly lobed or auriculate, exopod more or less exposed. Chelipeds even in adult ♂ weak. 3rd and 4th legs longest. No brushes of hairs between any of the legs. Abdomen with 7 segments in ♀; in ♂ with 5, the 3rd–5th being fused but without obliteration of the sutures (Alcock); ♂ with 7 segments, evenly tapering (Stebbing).

Tylodiplax blephariskios (Stebb.)

Fig. 21, *j–l.*

1924. Stebbing, Ann. S. Afr. Mus., xix, p. 3, pl. 1 (Crust., pl. 116) (*Cleistostoma b.*).

Carapace smooth or feebly setose, antero-laterally rounded, without tooth (Stebbing's figure) or with a small blunt tooth, behind which the lateral margin minutely granulate, regions ill-defined, front deflexed, its antero-lateral corners quadrate, a median groove and a lateral groove near the inner orbital margin, two inconspicuous humps behind the front on anterior gastric region. Supra- and infra-orbital margins smooth. Eye-stalk tapering distally, with long setae on front and hind margins, cornea very small, terminal and ventral, scarcely visible dorsally, feebly pigmented (Stebbing's figure "oi" (=*oc*) is correct, but the representation of the eyes *in situ* in figure "car" is not good). 3rd joint of 3rd maxilliped narrow at base, 4th joint strongly dilated. Cheliped setose, strong fringes along upper and lower margins of hand, and in ♀ along middle of outer surface of hand, and along margin of finger and thumb, finger in ♂ with tooth near middle, finger and thumb in ♀ meeting along nearly whole length, apices acute. Legs setose, dactyls flattened, with strong fringe on both fore and hind edges. Abdomen (Stebbing's figure presumably ♂) with 7 segments, evenly tapering; in ♀ with 7 segments, the middle segments very broad.

Length ♂ 6 mm., ovig. ♀ 7 mm., breadth ♂ 9·5 mm., ♀ 11 mm.

Locality.—Delagoa Bay (Stebbing). Dredged in 3 fathoms, bottom black mud (K. H. B. 1912).

Remarks.—The specimen sent to, and described by, Stebbing seems to have been a ♂. It has not been returned to the South African Museum. A second specimen, an ovigerous ♀, has since been found amongst my 1912 collection of marine organisms. It is here figured and its description embodied in the above diagnosis of the species.

This species differs from *tetratylophorus* de Man (from Penang) in

its smooth carapace, and from *indica* Alcock (Karachi) in its rounded antero-lateral margin and conspicuous "eye-lashes." (See Addenda.)

Family GECARCINIDAE.

Land Crabs.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, pp. 283, 440 (*Geocarcinidae*).
1910. Stebbing, *l. c.*, p. 324.
1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 339.
1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 132.

Carapace vaulted, branchial regions inflated, lateral margins convex, not sharply defined except anteriorly, front deflexed, its width considerably less than greatest width of carapace, orbits small. 3rd maxillipeds widely separated, 5th joint inserted in middle of apical margin or at antero-external angle of 4th joint, exopod slender, exposed or partly concealed. Chelipeds robust. Legs strong, dactyls long, usually spinose. Male genital openings sternal.

Remarks.—Land crabs, usually brightly coloured, burrowing in mud-banks, under stones or fallen trees, often at a considerable distance away from water. Usually enters water only for spawning [see Andrews, Monogr. Christmas Island, 1900, p. 163 (species wrongly identified, *fide* Tesch)].

Gecarcinus lagostoma appears in Stebbing's 1910 Catalogue with a reference to Calman, who remarks that the history of the specimen alleged to have come from the Cape of Good Hope cannot be traced, and that there is no trustworthy evidence of the occurrence of this species outside the Atlantic region. It occurs at Ascension Is. The genus is distinguished from *Cardisoma* by the front-orbital width being less than half the greatest width of carapace.

Gen. Cardisoma Latr.

1910. Stebbing, *l. c.*, p. 325.
1918. Rathbun, l. c., p. 340.
1918. Tesch, *l. c.*, p. 136.

Fronto-orbital width much more than half the greatest width of carapace. Buccal cavity longer than wide. Exopod of mxp. 3 exposed, with flagellum. Chelipeds equal or unequal. Dactyls of legs spinose. Abdomen in both sexes with 7 segments.

Remarks.—The west African species *armatum* Herklots occurs as far south as Angola (Rathbun, 1921, Bull. Amer. Mus. Nat. Hist., xliii, p. 456, with figs., including photograph of burrow).

Cardisoma carnifex (Herbst)

Fig. 23, *a*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 801.

1910. Stebbing, *l. c.*, p. 325.

1917. *Id.*, Ann. Durban Mus., i, p. 437.

1918. Rathbun, *l. c.*, p. 343 (differences between *carnifex* and *guanhumi*).

1918. Tesch, *l. c.*, p. 137.

1934. Gordon, Res. Sci. Ind. orient Néerland, iii, fasc. 15, p. 5 (comparison with *hirtipes*).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 187, pls. 97, 98.

Epibranchial tooth immediately behind outer orbital angle, lateral margin of carapace strongly and abruptly bulging behind the epibranchial tooth, carapace strongly convex, regions indistinct. Width of orbit not much more than half its length, infra-orbital border at right angles to the lateral border. 4th joints of legs with bristles only at distal end (Alcock), with a few hairs only at hind margin (Tesch).

Length up to 66 mm., breadth 87 mm. Violaceous, chelipeds bright red.

Localities.—Mozambique (Hilgendorf); Durban Bay (Stebbing).

Distribution.—Mauritius, Madagascar, east coast of Africa, and Indo-Pacific.

Remarks.—This crab would seem to be rare, or at least local, on the Natal coast. In the course of a collecting trip from Natal to Mozambique in 1912–13 I did not come across a single specimen. Neither Dr. C. J. van der Horst nor Professor T. A. Stephenson have obtained it in Delagoa Bay or Natal and Zululand. Being largely nocturnal in habits it may possibly have escaped observation.

Family GRAPSIDAE.

1880. Kingsley, Proc. Ac. Nat. Sci. Philad., pt. 2, p. 187.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 485 (key, subfam. typ. err.: for "*Ocypodinae*" read *Grapsinae*).

1910. Stebbing, *l. c.*, p. 316.

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 224.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 70.

Carapace flattened or not strongly vaulted, subquadrangular, lateral margins straight or only slightly convex, front very broad, exceeding the length of the short thick eye-stalk. A gap, often wide, between the 3rd maxillipeds (fig. 25, *b*). Chelipeds robust, often furry on palm or between finger and thumb. Legs strong. Male genital openings sternal.

Remarks.—Essentially littoral crabs, living on rocky coasts, sandy beaches in mangrove swamps and estuaries of rivers, or even in fresh water; *Planes* is pelagic on floating timber and weeds; *Geograpsus* is terrestrial.

Key to the South African Genera.

I. Ant. 1 folding beneath front in usual manner (fig. 22, *d*, *e*).
  A. No oblique hairy ridge on exposed surface of mxp. 3.
    1. A wide gap between mxp. 3, exopod narrow. Infra-orbital margin extending uninterruptedly to buccal cavity (fig. 22, *a*, *b*). ♂ abdomen fills all the space between bases of 5th legs . . . . . (*Grapsinae*).
      a. Front less than half greatest width of carapace (fig. 23, *b*, *c*).
        i. Finger and thumb of chela with broad spooned apices . . *Grapsus*.
        ii. Finger and thumb with acute apices. An opening, fringed with hairs, between bases of 3rd and 4th legs. Terrestrial . . . *Geograpsus*.
      b. Front half or more than half the greatest width of carapace (fig. 23, *d*, *e*).
        i. Ant. 2 entering orbit (fig. 22, *b*, *c*).
          α. Carapace depressed, very distinctly striated right across . *Pachygrapsus*.
          β. Carapace convex, smooth . *Planes*.
        ii. Ant. 2 excluded from orbit by lobe or tooth at inner orbital angle (fig. 22, *a*). Carapace feebly striated laterally. No tooth behind outer orbital tooth . *Metopograpsus*.
    2. A moderate gap between mxp. 3, exopod broad. Infra-orbital margin incomplete, supplemented by a suborbital crest (fig. 22, *c*). Abdomen ♂ rarely occupying all the space between bases of 5th legs (*Varuninae*) . *Varuna*.
  B. An oblique hairy ridge on mxp. 3, between which is a wide gap in middle line (fig. 25, *b*) (*Sesarminae*).

1. Lateral margin of carapace nearly straight, greatest width anteriorly (sometimes posteriorly). Pterygostomial region very distinctly reticulate (fig. 25, *b*) . . . *Sesarma.*
2. Lateral margin convex, greatest width across middle of carapace . . . . *Cyclograpsus.*

II. Ant. 1 folding longitudinally in deep notches in the front, visible in dorsal view (fig. 26, *a*) (*Plagusinae*).

A. 4th joint of mxp. 3 as broad as 3rd. Hand of cheliped not swollen, variously grooved, rugulose, or granulate (fig. 26, *b*, *g*) . . . . *Plagusia.*

B. 4th joint of mxp. 3 much smaller and narrower than 3rd. Hand of cheliped swollen, especially in ♂, smooth (fig. 26, *j*) . . . . . *Percnon.*

Gen. Grapsus Lam.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 390.
1910. Stebbing, *l. c.*, p. 317.
1918. Rathbun, *l. c.*, p. 226.
1918. Tesch, *l. c.*, p. 70.

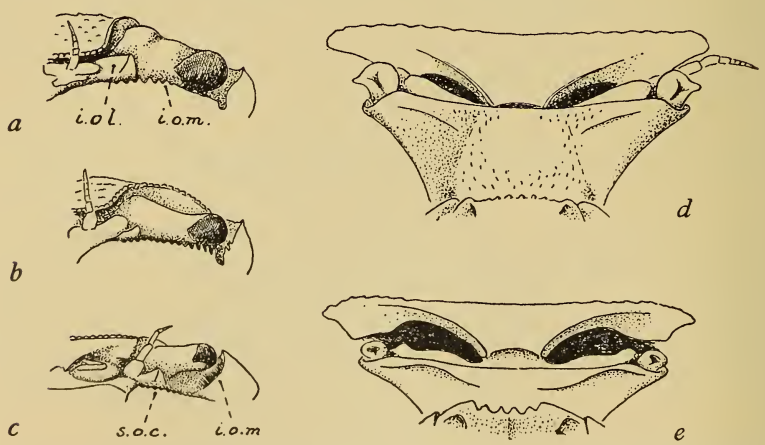


Fig. 22.—*Metopograpsus*. *a*, ventral view of orbit, to show complete infra-orbital margin (i.o.m.) and ant.2 excluded from orbit by inner orbital lobe (i.o.l.).
Pachygrapsus. *b*, the same, showing ant. 2 entering the orbit.
Varuna. *c*, the same, showing incomplete infra-orbital margin supplemented by the sub-orbital crest (s.o.c.).
Grapsus maculatus (Catesby). *d*, ventral view of front and epistome, ant. 1 removed, socket narrow.
Grapsus strigosus (Herbst). *e*, the same, socket broad.

Carapace little broader than long, depressed, branchial groove distinct, hepatic and branchial regions with regular *obliquely* transverse ridges, lateral margin convex with one tooth behind outer

orbital angle; front strongly deflexed. Orbit divided into 2 fossae. Chelipeds subequal, shorter than legs, finger and thumb apically spooned. Legs with broad and compressed joints, especially the 4th joints, dactyls spinose.

Remarks.—Common on rocky coasts.

Key to the South African Species.

1. Front much deflexed, its height half the distance between eye-stalks. Sockets of ant. 1 very narrow, almost closed by front. Epistome 3 times as wide as its median length (fig. 22, *d*). 5th + 6th joints of 4th leg together longer than 4th joint. 2nd leg much shorter than 5th . . . . . *maculatus.*
2. Front less deflexed, its height less than half distance between eye-stalks. Sockets of ant. 1 wide open. Epistome scarcely ¼ as long as wide, a strong transverse ridge on its lateral portions (fig. 22, *e*). 5th + 6th joints of 4th leg together equal to or only slightly longer than 4th. 2nd and 5th legs subequal . . *strigosus.*

Grapsus maculatus (Catesby)

Figs. 22, *d*, 23, *b*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 807.

1910. Stebbing, *l. c.*, p. 317.

1912. Lenz, Ark. Zool., vii, no. 29, p. 6 (*grapsus*).

1918. Rathbun, *l. c.*, p. 227, fig. 135, and pls. 53, 54 (*grapsus*).

1918. Tesch, *l. c.*, p. 71, pl. 4, figs. 2, 3.

1921. Rathbun, Bull. Amer. Mus. Nat. Hist., xliii, p. 441, pl. 38 (*grapsus*), and pl. 56, fig. 1, pl. 57, fig. 2 (habitats).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 178, pl. 90 (*grapsus*).

1945. Stephensen, Dan. Sci. Invest. Iran. pl. 4, p. 194, fig. 59, A–D (plp. 1, 2 ♂).

Alcock and Tesch have summarized the differences between this and the next species. Both are somewhat variable, and both have a slender-legged variety (*gracilipes* and *longitarsis* respectively).

The Atlantic (typical) form of *maculatus* has the lobe on the wrist of cheliped very broad and ending in a short point, while the Indo-Pacific form (*tenuicrustatus* Herbst) has the lobe narrow and ending in a long slender spine.

Length up to 64 mm., breadth 68 mm. Dark green mottled with yellow, red or yellow chelae, and mottled legs; or dark green with

yellow lines between the oblique ridges, reddish-yellow legs and blood-red chelae (Krauss).

Localities.—Natal (Krauss, Kingsley); Amanzemtoti, Natal (Lenz);

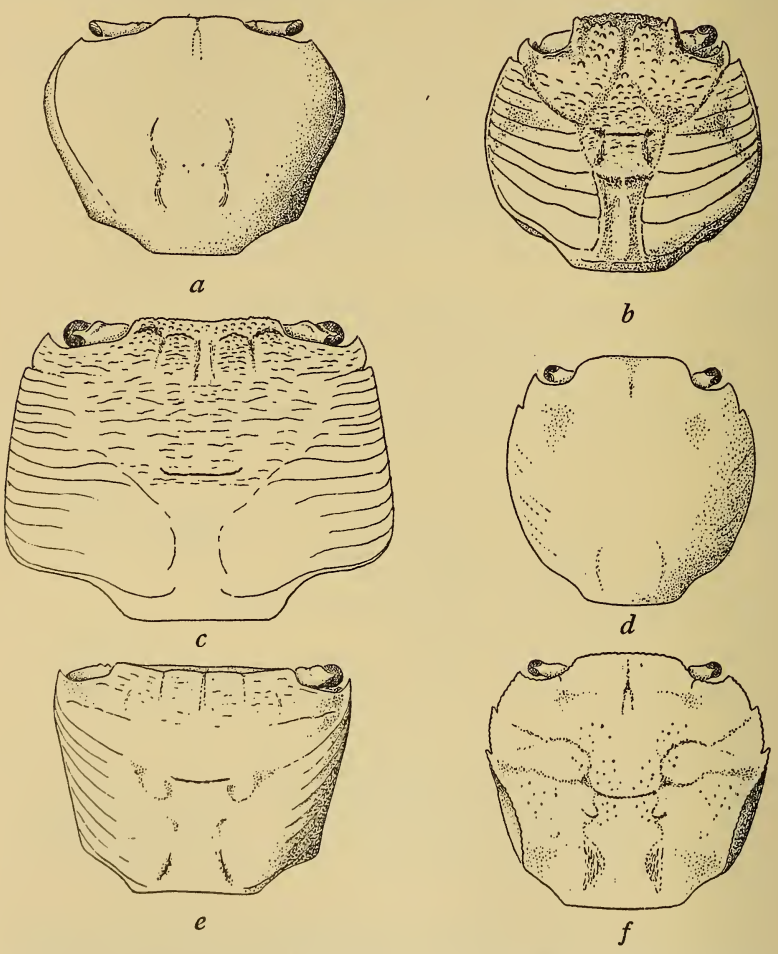


Fig. 23.—*a*, *Cardisoma carnifex* (Herbst). *b*, *Grapsus maculatus* (Catesby). *c*, *Geograpsus lividus* (M. Edw.). *d*, *Planes minutus* (Linn.). *e*, *Metopograpsus messor* (Forsk.). *f*, *Varuna litterata* (Fabr.).

Mozambique (Hilgendorf and S. Afr. Mus.); Umhlali, Natal (coll. T. A. Stephenson).

Distribution.—Mauritius, Madagascar, east coast of Africa, Indo-Pacific. Typical form; tropical and subtropical America, Atlantic, Ascension Is.

Grapsus strigosus (Herbst)

Figs. 22, *e*, 24, *a*.

1838. McLeay, Annulosa S. Afr., p. 66 (*strigosa* and *flavipes*).
1910. Stebbing, *l. c.*, p. 317.
1918. Tesch, *l. c.*, p. 71, pl. 4, figs. 1, 4.

See key and remarks under *maculatus*. 1st pleopod ♂ stout, with apical, strongly chitinized process concealed in a dense brush of setae and bristles.

Dark brown, or greenish brown, mottled.

Localities.—Natal (Krauss, Kingsley, Miers, Stebbing); Mozambique (Hilgendorf, Miers); East London, Natal coast, Delagoa Bay, Mozambique (S. Afr. Mus.); Umhlali, Natal (coll. T. A. Stephenson).

Distribution.—Madagascar, east coast of Africa, Indo-Pacific.

Remarks.—According to material at hand, this species seems to be commoner in Natal than *maculatus*.

Gen. Geograpsus Stimpson

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 101.
1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 394.
1918. Rathbun, *l. c.*, p. 231.
1918. Tesch, *l. c.*, p. 74.
1942. Ward, Mauritius Inst. Bull., ii, p. 105.

Carapace flattened, lateral margins nearly straight; front not strongly deflexed; ridges on hepatic and branchial regions *transverse*. Epistome very short. Chelipeds more massive than legs, in adult ♂ at least as long as the longest leg, finger and thumb with acute apices. Between the 3rd and 4th legs a narrow opening, fringed with hairs, leading to the branchial chamber. Terrestrial.

Key to the South African [Mauritian] Species.

1. Lateral margins of carapace coverging behind epibranchial teeth, obtuse and not keeled in their posterior half . [*grayi*, Mauritius].
2. Lateral margins subparallel or slightly diverging posteriorly, sharply keeled throughout . . . . . *lividus*.

Geograpsus lividus (M. Edw.)

Fig. 23, *c*.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 85.

1895. de Man, Zool. Jahrb. Abt. Syst., ix, p. 88, and subsp. *stormi* de Man.

1898. *Id.*, *ibid.*, x, pl. 28, fig. 18, *a*, *c*.

1900. Alcock, *l. c.*, p. 396 (*crinipes*, non Dana; see Tesch, p. 74, footnote).

1918. Rathbun, *l. c.*, p. 232, pl. 55.

1918. Tesch, *l. c.*, pp. 74, 75 (subsp. *stormi*).

1921. Rathbun, Bull. Amer. Mus. Nat. Hist., xliii, p. 442, pl. 15, fig. 1, pl. 22, figs. 2, 3, and pl. 56, fig. 1, pl. 57, fig. 2 (habitats).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 362.

Lateral margins of carapace diverging posteriorly and sharply keeled throughout. Cardiac and intestinal regions smooth except for a few transverse striae immediately behind cervical groove. Width of 4th joints of legs more than half their length; hind margin of 4th joints of 2nd–4th legs distinctly dentate distally; last 3 joints of legs with long bristles.

Length up to 40 mm., breadth 45 mm.

Localities.—Natal and Delagoa Bay (S. Afr. Mus.).

Distribution.—Typical form; east and west coasts of tropical America, West Indies, Cape Verde Is., Congo River mouth. Subsp. *stormi*: Madagascar, east coast of Africa, Indo-Pacific.

Remarks.—The first specimen, on which this species was included in the South African fauna-list, was supplied by Mr. Bell Marley in 1926, and was stated to have come from the Natal coast. I have since seen a specimen from Delagoa Bay, thus confirming its occurrence on the South African coast.

The subsp. *stormi* is distinguished by having the sharp keel from antero-lateral corner of buccal cavity convex instead of straight or slightly sigmoid.

Gen. Pachygrapsus Randall

1910. Stebbing, *l. c.*, p. 319.

1918. Rathbun, *l. c.*, p. 240.

1918. Tesch, *l. c.*, p. 75 (key to Indo-Pacific species).

1921. Stebbing, Ann. S. Afr. Mus., xviii, p. 458.

1934. Gordon, Res. Sci. Ind. orient. Néerland, iii, fasc. 15, p. 7 (1st plp. ♂ of 2 species).

Carapace quadrate, little convex, regions ill-defined, with transverse ridges, lateral margin with 1–3 teeth, or none, behind outer orbital tooth, front deflexed, half or more than half maximum width of carapace. Lobe at lower inner angle of orbit small, so that ant. 2 is not excluded from orbit. Chelipeds equal or unequal, massive, finger and thumb apically spooned.

Key to the South African Species.

1. No tooth behind outer orbital tooth . . . . *plicatus.*
2. Three teeth behind outer orbital tooth . . . . *polyodous.*

Pachygrapsus plicatus (M. Edw.)

Fig. 22, *b*, 24, *b*.

1843. Krauss, Südafrik. Crust., p. 43, pl. 3, fig. 1, *a–c*.
1910. Stebbing, *l. c.*, p. 319 (*kraussii*).
1918. Tesch, *l. c.*, p. 77 (references).
1934. Balss, Faune Col. Franç, v, p. 524.

Lateral margins feebly convergent posteriorly, without any tooth behind outer orbital angle; transverse ridges well developed, extending right across carapace, each ridge fringed anteriorly with hairs. Cheliped, 4th joint with a dentate inner lower margin, 5th joint with a strong spine on inner margin and some granules on upper surface, 6th joint granulate above, outer surface with 4–5 finely beaded longitudinal ridges, two of which are continued on to thumb, finger granulate above at base. 4th joints of legs with transverse ciliate ridges, 2 denticles at upper apex and 2 at lower apex, the former obscure in 5th leg, the 4th joint of which has in addition a third tooth on hind margin just before the middle (this is only the accentuated end of one of the transverse ridges, and may explain how Krauss came to figure the hind margin with several denticles); 5th and 6th joints with longitudinal ciliate ridges, dactyls with numerous golden spines, 4th–7th joints with scattered long bristles.

1st pleopod ♂ tapering distally and ending in 2 cowl-like lobes, between which the seminal canal opens.

Length 11 mm., breadth 15 mm. Reddish, mottled with yellowish, hand, finger and thumb whitish, hairs on the transverse ridges white.

Localities.—Natal (Krauss); Isipingo, Natal (S. Afr. Mus.); Umtwalumi, Natal (coll. T. A. Stephenson).

Distribution.—Mauritius, Réunion, and Indo-Pacific, but apparently rare in western portion; Maldives (Borradaile), Seychelles (Rathbun).

Pachygrapsus polyodous Stebb.

1921. Stebbing, *l. c.*, p. 458, pl. 16 (Crust., pl. 111).

Lateral margin with 3 acute teeth behind the outer orbital tooth. Transverse ridges absent?. Cheliped, 4th joint with 2 strongly dentate ridges on inner side.

Length 18 mm., breadth 22 mm.

Locality.—Off Umhlangakulu River mouth, Natal, 50 fathoms (Stebbing).

Remarks.—Only one ♂ specimen was captured. It has not been returned to the South African Museum, so I am unable to check Stebbing's description or give further details.

Gen. Metopograpsus M. Edw.

1910. Stebbing, *l. c.*, p. 319.

1918. Tesch, *l. c.*, p. 78 (key to species).

Distinguished from *Pachygrapsus* by the large lobe at inner orbital angle which excludes ant. 2 from the orbit. No tooth, or one tooth, on lateral margin behind outer orbital angle.

Metopograpsus messor (Forskal)

Figs. 22, *a*, 23, *e*, 24, *c*.

1888. de Man, J. Linn. Soc. Lond., xxii, p. 144, pl. 9, fig. 11 (*chela*).

1891. *Id.*, Notes Leyden Mus., xiii, p. 49, pl. 4, fig. 14 (leg) (var. *gracilipes*).

1910. Stebbing, *l. c.*, p. 319.

1917. *Id.*, Ann. Durban Mus., i, p. 438.

1918. Tesch, *l. c.*, p. 79.

1945. Stephensen, Dan. Sci. Invest. Iran. pt. 4, p. 195, fig. 59, E–G (plp. 1, 2 ♂).

Carapace about $\frac{4}{5}$ as long as broad (across outer orbital angles), sides convergent posteriorly, no lateral tooth behind outer orbital

angle, front about $\frac{3}{5}$ maximum breadth of carapace; fine oblique lines laterally and some fine transverse lines on post-frontal region. Lobe at inner orbital angle adnate along nearly whole of its margin



Fig. 24.—1st pleopod ♂ (whole appendage shown in ventral view).
Grapsus strigosus (Herbst). *a*, with apex in ventral (above) and dorsal (below) view, hairs removed. Base of 2nd pleopod *in situ*.
Pachygrapsus plicatus (M. Edw.). *b*, with apex further enlarged, and in median view.
Metopograpsus messor (Forsk.). *c*, with dorsal view of apex, hairs removed.
Varuna litterata (Fabr.). *d*, with dorsal view of apex.
Planes minutus (Linn.). *e*, with dorsal view of apex, hairs removed.
Cyclograpsus punctatus M. Edw. *f*, with median (above) and dorsal (below) views of apex.

with the front, sharp and keeled. Chelipeds somewhat unequal, 4th, 5th, and 6th joints with transverse striae or ridges, inner margin of 4th denticulate, 5th with 1 or 2 spines, hand granulate on upper and lower margins, smooth on outer surface except near lower margin where there are a few oblique striae, and a fine ridge subparallel to

lower margin and continued on to thumb. Legs with stiff outstanding hairs, dactyls (including ungues) nearly as long as 6th joints. Abdomen in ♂ evenly tapering.

1st pleopod ♂ stout, with apical strongly chitinized spatulate process, partly concealed in setae, and surrounded by membranous (mobile) integument.

Length 23 mm., breadth 30 mm. Mottled and speckled with dark reddish brown on a pale ground-colour, legs banded, hand of cheliped pink or crimson.

Localities.—Mouth of Umlaas River, Natal (Krauss); Natal (Kingsley); Durban (Stebbing); East London (coll. T. A. Stephenson); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Mauritius, Madagascar, east coast of Africa, Seychelles, Red Sea, Indo-Pacific.

Gen. Planes Bowdich

1910. Stebbing, *l. c.*, p. 320.

1918. Rathbun, *l. c.*, p. 253.

1918. Tesch, *l. c.*, p. 83 (in key) and footnote 2.

Carapace about as long as broad, evenly convex, front not deflexed, regions scarcely defined, usually a slight notch behind outer orbital tooth. Lobe at inner orbital angle small, not excluding ant. 2 from orbit. Chelipeds robust, subequal. Legs flattened, fringed with setae, semi-natatory.

Remarks.—Tesch includes this genus in his key to the genera of *Varuninae*, but the lower orbital border and the ♂ abdomen occupying all the space between the bases of the 5th legs indicate that it is more properly included in the *Grapsinae*, as is done by Rathbun.

Pelagic crabs, widely distributed, found on Sargassum weed and other floating objects, turtles and jelly-fishes. Frequently washed up on shore.

Planes minutus (Linn.)

Sargassum, or Gulf-weed Crab.

Figs. 23, *d*, 24, *e*.

1838. McLeay, Annulosa S. Afr., p. 66 (*Nautilograpsus major*) and p. 67 (*N. smithii*).

1843. Krauss, Südafrik. Crust., p. 44 (*Nautilograpsus m.* and *s.*).

1880. Kingsley, Proc. Ac. Nat. Sci. Philad., pt. 2, p. 202 (*Nautilograpsus m.*).

1904. Doflein, D. Tiefsee Exp., vi, p. 130.

1910. Stebbing, *l. c.*, p. 320 (part: not the specimens no. 15070 which = *Litocheira kingsleyi*).

1914. Lenz and Strunck, D. Südpol Exp., xv, p. 284.

1918. Rathbun, *l. c.*, p. 253, pl. 63.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 74, pl. 2, fig. 2 (coloured).

1927. Hale, Crust. S. Austral., pt. 1, p. 181, fig. 182.

1941. Hitchcock, Biol. Bull. Woods Hole, lxxx, p. 26 (colour changes).

1942. Ward, Mauritius Inst. Bull., ii, p. 106 (*major*).

1944. Lebour, Zoologica, xxix, p. 114, fig. 4 (larval stages).

Carapace almost glabrous, but faintly punctate and with faint oblique lines laterally. The notch behind outer tooth may be almost or quite obsolete. 1st pleopod ♂ very short and stout, apical point concealed in setae.

Length up to ♂ 25 mm., breadth 24 mm. Reddish, pinkish, or greyish, often with a white or cream patch in middle of carapace, sometimes pale bluish, cobalt-blue, or lilac.

Localities.—Natal (Kingsley); False Bay (Stebbing); Table Bay, False Bay, Knysna (S. Afr. Mus.); Chinde, Portuguese East Africa, washed ashore (coll. K. H. B. 1912).

Distribution.—Tropical and temperate seas, but mainly Atlantic. Not recorded by Alcock (1900) as a member of the Indian fauna, but recorded from the southern Indian Ocean by Doflein, and from Mauritius by Ward.

Remarks.—The unusually large ♂, whose measurements are given above, was washed ashore on the west coast of the Cape Peninsula, near Cape Point, September 1913 (K. H. B.).

Gen. Varuna M. Edw.

1910. Stebbing, *l. c.*, p. 319.

1918. Tesch, *l. c.*, p. 84.

Carapace about as broad as long, depressed, with sharp edges, lateral borders convex, toothed anteriorly, regions fairly well defined, especially the gastric-cardiac and cardiac-branchial grooves, front a little more than $\frac{1}{3}$ maximum width of carapace, straight, little deflexed. Chelipeds equal, in adult ♂ robust. Legs with 5th–7th joints flattened,

dilated, and fringed with hairs, natatory. Abdomen of 7 segments in both sexes, in ♂ not covering whole width between bases of 5th legs.

Varuna litterata (Fabr.)

Figs. 22, *c*, 23, *f*, 24, *d*.

1897. Weber and de Meijere, Zool. Jahrb. Abt. Syst., x, p. 157.
1902. de Man, Abh. Senckenb. Ges., xxv, p. 504.
1910. Stebbing, *l. c.*, p. 319.
1915. Kemp, Mem. Ind. Mus., v, p. 232.
1918. Tesch, *l. c.*, p. 85.
1933. Hora, Proc. Zool. Soc. Lond., pt. 4, pp. 881 *sqq.*, pl. 1 (bionomics).

Carapace pitted, but glabrous; lateral border with 2 sharp teeth behind outer orbital tooth; a well-defined H-shaped mark in middle of carapace. Upper orbital margin notched. Legs not hairy, except for the fringes on last three joints. 1st pleopod ♂ apically bilobed, with 2 strongly chitinized ridges on inner (dorsal) surface of the larger lobe.

Length up to 50 mm., breadth 56 mm. Reddish brown.

Localities.—Illovo, Umbilo, and Umhloti Rivers, Isipingo, Natal (Weber and de Meijere); Natal (Stebbing); off Durnford Point, Zululand, 45 fathoms (S. Afr. Mus.).

Distribution.—Mauritius, east coast of Africa, Indo-Pacific.

Remarks.—Ascends estuaries, even into fresh water, and is also found at sea on floating timber.

Gen. Sesarma Say

Marsh Crabs.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 506.
1910. Stebbing, *l. c.*, p. 320.
1917. Tesch, Zool. Med. Leyden Mus., iii, pp. 127, 235.
1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 284.
1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 109.
1933. Hora, Proc. Zool. Soc. Lond., pt. 4, pp. 881 *sqq.*, pl. 2 (bionomics of *tetragonum* Fabr.).
1937. Gordon, Proc. Linn. Soc. Lond., p. 150.
1940. Tweedie, Bull. Raffles Mus., xvi, p. 88.

Carapace squarish, sides nearly straight and usually nearly parallel,

with or without a tooth behind outer orbital tooth, front wide, deflexed, usually with 4 more or less prominent post-frontal bosses, dorsal regions usually well defined, oblique lines laterally, pterygostomial region and vertical walls of carapace reticulated with intersecting lines of fine hairs. Ant. 2 not excluded from orbit. Chelipeds subequal, robust, especially in ♂. Legs rather slender, except the 4th joints. 7th abdominal segment in ♂ usually shorter than its basal width; in ♀ narrow and deeply embedded in 6th segment.

Remarks.—Alcock's (1900, p. 410) reluctance to accept the subgenera proposed by de Man seems well founded.

In the descriptions the distinction between a *pectinate* and a *granulate* ridge should be noted: the pectinate ridge consists of a number of closely set, palisade-like, stout horny spines, sometimes subacute, sometimes blunt (fig. 25, *g*). One of the two ridges in *catenata* is definitely pectinate, while the other has rather elevated, closely set granules, which are sometimes horny at their apices, thus forming a transition between the two kinds of ornamentation (fig. 25, *c*).

As the records of *picta*, except those from Japan and China, have been doubted (Tesch, 1917, *l. c.*, p. 187), this species is not admitted here. Possibly Krauss' specimens are still available, and if so should be re-examined. See also Gordon's remarks (1937) on *maculata*.

Tropical and subtropical, living in mud-banks, marshes, and mangrove-swamps. On the west coast of Africa the genus occurs as far south as Angola (Rathbun, 1921, Bull. Amer. Mus. Nat. Hist., xliii, p. 446).

Key to the South African Species.

1. Two teeth on lateral margin behind outer orbital tooth. Carapace longer than broad . . . . . *smithii.*
2. One tooth behind outer orbital tooth.
   - *a.* Lateral margins divergent posteriorly . . . *longipes.*
   - *b.* Lateral margins subparallel or slightly convergent posteriorly.
     - i. Inner margin of 4th joint of cheliped without tooth. No *pectinate* ridges on upper margin of hand (fig. 25, *e*) . . . . . *meinerti.*
     - ii. Inner margin of 4th joint of cheliped with a sharp tooth. Two pectinate ridges on upper margin of hand (fig. 25, *g*) . . . *guttata.*
3. No tooth behind outer orbital tooth.
   - *a.* Upper surface of hand of cheliped with 2 obliquely transverse *pectinate* ridges; inner margin of 4th joint with large spine, 5th joint with smaller one . . . . . *plicata.*

b. Upper surface of hand with only *one pectinate* ridge; no sharp spines on 4th or 5th joints of cheliped.
i. Upper margin of finger of cheliped with longitudinally-oval, milled tubercles (fig. 25, *c*). Finger and thumb widely gaping, but less so in ♀ than in ♂, furry at their junction . *catenata.*
ii. Upper margin of finger with transversely-oval tubercles proximally, and longitudinally-oval tubercles distally (fig. 25, *i*). Finger and thumb not widely gaping, not furry . *eulimene.*

Sesarma (*Sesarma*) *smithii* M. Edw.

1853. Milne Edwards, Arch. Mus. Paris, vii, p. 149, pl. 9, fig. 2.
1853. *Id.*, Ann. Sci. Nat. (3), xx, p. 187.
1880. Kingsley, Proc. Ac. Nat. Sci. Philad., pt. 2, p. 217.
1893. Bürger, Zool. Jahrb. Abt. Syst., vii, p. 618, pl. 21, fig. 2.
1917. Tesch, *l. c.*, pp. 199, 249 (references).

Carapace longer than its width across outer orbital angles, dorsally convex and uneven, lateral margins convex only anteriorly, 2 teeth behind outer orbital tooth, the 1st one with long outer margin. Cheliped in adult ♂ with 2 black blunt spines on upper margin of finger. Length of 6th abdominal segment ♂ distinctly greater than width of its posterior margin.

Locality.—Natal (M. Edwards).

Distribution.—Madagascar, Zanzibar, East Indies, Philippine Is., Fiji, Queensland.

Remarks.—Not included in Stebbing's 1910 Catalogue. I have not seen any of the above-mentioned references except Tesch, from whose key the above description has been taken.

Sesarma (*Sesarma*) *longipes* Krss.

1843. Krauss, Südafrik. Crust., p. 44, pl. 3, fig. 2, *a–d.*
1907. Borradaile, Trans. Linn. Soc. Lond., xii, p. 64.
1910. Stebbing, *l. c.*, p. 322.
1917. Tesch, *l. c.*, pp. 170, 241.

Carapace glabrous, lateral margins diverging posteriorly, one tooth behind outer orbital tooth, hind margin subequal to width of front, which is half the anterior width of carapace, anterior margin of front nearly straight, its antero-external angles rounded; post-frontal lobes obsolete (Krauss) or distinct, the middle pair larger than the outer pair (Alcock), median groove deep. Chelipeds subequal, no

tooth on inner margin of 4th or 5th joints, though inner angle of latter is pronounced, almost dentiform (Alcock), inner and outer surfaces of hand granulate (Alcock) (Krauss' figure shows outer surface smooth), a row of granules along lower margin continued to apex of thumb, upper margin without granulate or pectinate ridges (Alcock) or with a feeble keel (Krauss) or with a sharp rough ridge (Borradaile); upper margin of finger with a few sharp granules (Alcock) (smooth in Krauss' figure), finger and thumb not widely gaping, not furry at junction. Legs long, 4th leg about $2\frac{1}{2}$–3 times anterior width of carapace, lower margins of 4th joints smooth. 6th abdominal segment ♂ twice as broad as long.

Length 18 mm., breadth (posteriorly) 20 mm. Bright brownish red, with 8 yellowish spots, of which 2 are behind each orbit and the other 4 in middle of the carapace (Krauss).

Locality.—Umlaas River mouth (Krauss).

Distribution.—Andaman Is. and Seychelles.

Remarks.—Up to the present has not been rediscovered in South Africa.

Sesarma (*Sesarma*) *meinerti* de Man

Fig. 25, *e*, *f*.

1843. Krauss, Südafrik. Crust., p. 44 (*tetragona* M. Edw., non Fabr.).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 809 (*tetragona*? Fabr. M. Edw.).

1887. de Man, Zool. Jahrb. Abt. Syst., ii, pp. 648, 668.

1894. Ortmann, Semon's Austral. Reise, v, p. 56.

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 417.

1910. Stebbing, *l. c.*, p. 321 (*tetragonum*, non Fabr.).

1917. *Id.*, Ann. Durban Mus., i, p. 438 (*tetragonum*, non Fabr.) (25th July).

1917. Tesch, *l. c.*, pp. 171, 246 (references and synonymy) (28th July).

1917. Stebbing, Ann. Durban Mus., ii, p. 10 (*tetragonus*, non Fabr.) (December 1917).

1942. Chace, Bull. Mus. Comp. Zool. Harv., xci, p. 201.

Carapace dorsally with numerous little tufts of hair (easily rubbed off), lateral margins slightly converging posteriorly, with a tooth (and sometimes indications of a second tooth) behind and usually projecting further outwards than outer orbital tooth, hind margin shorter than

width of front, which is a little greater than half maximum width of carapace, its antero-lateral angles sharply quadrate, its anterior margin sinuous (emarginate medianly). Chelipeds subequal, front margin of 4th joint denticulate, but no tooth on either 4th or 5th joints, outer surface of latter squamose-rugulose, outer and lower surfaces of 6th joint pitted, with a few granules, chiefly near lower surface, inner surface granulate, with a curved row of larger tubercles subparallel to distal margin, upper surface without any pectinate ridges but a few irregular and variable sublongitudinal rows of granules; upper surface of finger with a row of inconspicuous serrations; finger and thumb widely gaping in large ♂, not furry at junction. Legs with upper surfaces of 5th and 6th joints furry. Length of 6th abdominal segment ♂ only a little less than proximal width.

Length up to 43 mm., breadth 47 mm. Dark violet above, pterygostomial regions also violet (sealing-wax red, *apud* Krauss), chelae bright red.

Localities.—Mozambique (Hilgendorf); Durban Bay (Krauss, Stebbing, and S. Afr. Mus.).

Distribution.—Mauritius, Madagascar, east coast of Africa, Indo-Pacific.

Remarks.—Chace quotes Loveridge that crocodiles feed on these crabs.

Sesarma (*Chiromantes*) *guttata* M. Edw.

Fig. 25, *g*, *h*.

1869. Milne Edwards, Nouv. Arch. Mus. Paris, v, p. 26.
1887. de Man, Zool. Jahrb. Abt. Syst., ii, p. 658.
1888. *Id.*, J. Linn. Soc. Lond., xxii, p. 177.
1917. Tesch, *l. c.*, pp. 155, 255.

Carapace with tufts of hair, lateral margins subparallel, one tooth behind outer orbital tooth, hind margin ¾ width of front which is a little more than half anterior width of carapace, anterior margin of front sinuous, its antero-lateral angles sharply quadrate, post-frontal lobes prominent, subequal. Chelipeds subequal, inner margin of 4th joint with a prominent acute tooth, rest of margin denticulate proximally and distally to the tooth, inner and outer surfaces of hand granulate, upper surface with 2 oblique pectinate ridges, a granulate ridge between inner and upper surfaces, outer surface of thumb more or less flattened with a slight ridge near lower margin, upper margin of finger with 12 transversely-oval tubercles, each with 1–3 transverse

striae, a row of smaller tubercles on inner side of and alternating with the larger one, finger and thumb not widely gaping, not furry at junction. 4th leg twice *length* of carapace; 4th joints of legs twice (or almost) as broad as long, lower (hind) margins smooth or feebly serrulate. Length of 6th abdominal segment ♂ twice in its proximal and $1\frac{1}{4}$ in its distal width. Horny apex of 1st pleopod ♂ sharply bent outwards.

Length 19 mm., breadth (anteriorly) 24 mm.

Locality.—Delagoa Bay (coll. K. H. B. 1912, and Lourenzo Marques Mus.).

Distribution.—Zanzibar.

Remarks.—Only one ♂ specimen was obtained by me in 1912; it seems to agree with *guttata* according to the comparison between it and other near species given by de Man in 1888. I have not seen his 1887 description. A second ♂, presumably from Delagoa Bay, was submitted by the Lourenzo Marques Museum (1940).

Distinguished from *plicata* by the tooth on lateral margin behind outer orbital tooth.

Sesarma (*Parasesarma*) *plicata* (Latr.)

1843. Krauss, Südafrik. Crust., p. 45 (*affinis*) (? and *picta*, non de Haan).

1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 413 (*quadratum*).

1910. Stebbing, *l. c.*, p. 321 (*quadratum*).

1917. Tesch, *l. c.*, pp. 187, 252 (references and synonymy).

1917. Stebbing, Ann. Durban Mus., ii, p. 10 (*quadratus*).

1932. Shen, Zool. Sinica, ix, p. 191, figs. 119, 120, and pl. 7, fig. 8.

Carapace with lateral margins slightly converging posteriorly, no tooth behind outer orbital tooth, front more than half greatest width of carapace, its anterior margin slightly sinuous; post-frontal lobes prominent, subequal, rugulose and setose. Chelipeds subequal, inner margin of 4th joint with a large subterminal spine, upper margin ending in a much smaller spine, upper surface of hand with 2 pectinate ridges and some short oblique granulate ridges (pectinate ridges absent in ♀; Alcock), upper surface of finger with 11–14 (–19) transversely oval milled tubercles, finger and thumb not widely gaping, not furry at junction. 4th joints of legs with hind margins smooth.

Length 16 mm., breadth 20 mm.

Localities.—Natal (Krauss): Durban Bay (Stebbing).

Distribution.—Mauritius, Madagascar, east coast of Africa, Indo-Pacific.

Remarks.—I have seen no specimens.

Sesarma (*Parasesarma*) *catenata* Ort.

Fig. 25, *a–d.*

1838. McLeay, Annulosa S. Afr., p. 65 (*reticulata*, non Say).

1843. Krauss, Südafrik. Crust., p. 45 (*reticulata* quoted from McLeay).

1897. Ortmann, Zool. Jahrb. Abt. Syst., x, p. 334, pl. 17, fig. 9.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 44 (*catenatum*).

1910. *Id.*, *l. c.*, p. 321 (*reticulatum*) and p. 322 (*catenatum*).

1917. Tesch, *l. c.*, pp. 141, 253.

1917. Stebbing, Ann. Durban Mus., ii, p. 10 (*Parasesarma catenatus*).

1921. *Id.*, *ibid.*, iii, p. 16, pl. 3 (*Parasesarma catenatus*; part: the Durban specimens).

Carapace glabrous, lateral margins slightly convergent posteriorly, no tooth behind outer orbital tooth, hind margin scarcely ¾ width of front, which is distinctly more than half greatest width of carapace, anterior margin of front slightly convex and sinuous, its antero-external angles rounded-quadrate; post-frontal lobes not very prominent, the middle pair slightly the larger. Chelipeds subequal, 4th joint with inner margin laminately expanded and denticulate, 5th joint without spine, inner surface of hand with tiny granules and some larger ones near finger-hinge, outer surface also with tiny granules, larger towards upper margin, often almost smooth, a fine beaded line at the lower third, subparallel to lower margin, and extending to about middle of cutting-edge of thumb, upper surface with a flat rhomboidal area bounded distally by a pectinate ridge, on either side by a granulate ridge, and crossed in middle by a row of close-set, often horny granules which might almost be termed a 2nd pectinate ridge, some additional granules proximally, finger with 5–6 longitudinally-oval milled tubercles flanked on inner side by a row of granules, finger and thumb widely gaping and proximally densely furry in ♂; in ♀ apparently not distinguishable from *eulimene*, without the distinctive rhomboidal area, and sculpture of finger indistinct. 4th joint of legs smooth on hind margins. Length of 6th abdominal segment ♂ subequal to distal width and a little less than half proximal width. Apex of 1st pleopod ♂ curving slightly, but not markedly outwards.

Length up to ♂ 20 mm., ♀ 13 mm.; breadth ♂ 25 mm., ♀ 17 mm.

Dark brownish, legs rather reddish, speckled, chelae more or less orange, or orange-brown, finger and thumb paler.

Localities.—Keurbooms River, Plettenberg Bay (Stebbing); Durban Bay (Stebbing); East London, and Umkomaas, Natal (S. Afr. Mus.).

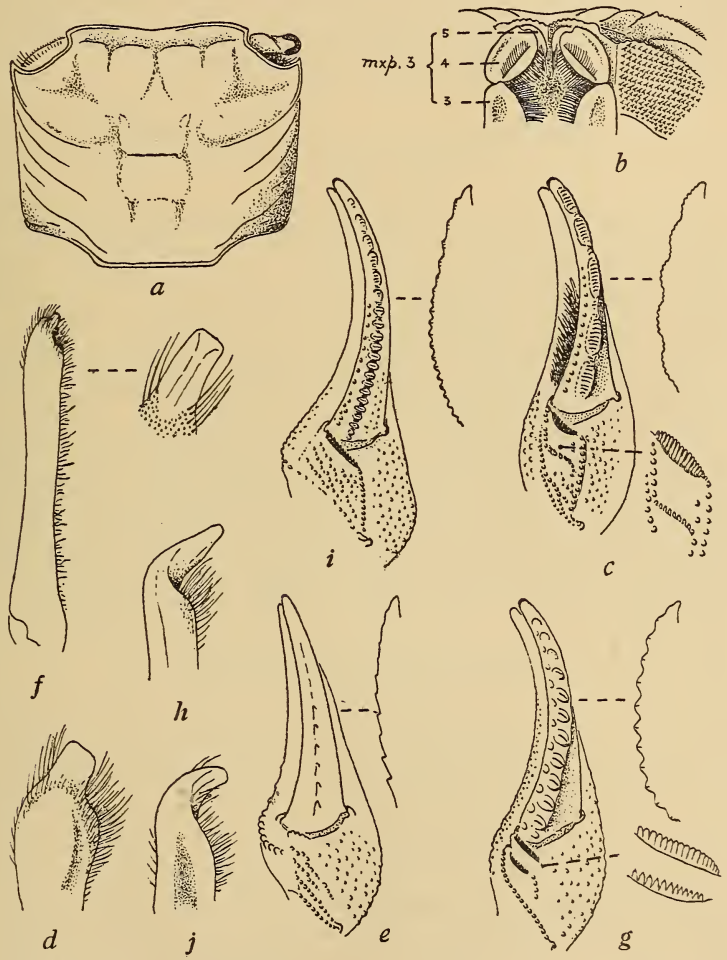


Fig. 25.—*Sesarma catenata* Ort. *a*, carapace. *b*, ventral surface showing 3rd maxillipeds and part of pterygostomial region. *c*, upper surface of hand and finger of chela ♂, with rhomboidal area further enlarged, and profile of upper margin of finger. *d*, apex of 1st pleopod ♂.

Sesarma meinerti de Man. *e*, upper surface of hand and finger of chela ♂, with profile of finger. *f*, 1st pleopod ♂ with apex further enlarged, most of the hairs removed.

Sesarma guttata M. Edw. *g*, upper surface of hand and finger of chela ♂, with pectinate ridge further enlarged, and profile of finger. *h*, apex of 1st pleopod ♂.

Sesarma eulimene de Man. *i*, upper surface of hand and finger of chela ♂, with profile of finger. *j*, apex of 1st pleopod ♂.

Remarks.—The Keurbooms River is the most westerly locality on the southern coast of South Africa yet recorded for any species of this genus. Its presence there I was personally able to confirm in 1931.

Males are easily recognizable by the gaping and furry finger and thumb of the chela; and the rhomboidal area with the two ridges (one pectinate, the other partly so) on the hand of ♂ is very characteristic. Females are indistinguishable from those of *eulimene*.

Sesarma (*Holometopus*) *eulimene* de Man

Fig. 25, *i*, *j*.

1897. de Man in Weber and de Meijere, Zool. Jahrb. Abt. Syst., x, p. 157, pl. 15, fig. 1, *a–g*.

1910. Stebbing, *l. c.*, p. 322.

1917. Tesch, *l. c.*, pp. 150, 237.

1921. Stebbing, Ann. Durban Mus., iii, p. 16 (*catenatus* part: specimen from Delagoa Bay).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Carapace pitted, glabrous except for scattered setules, lateral margins parallel, no tooth behind outer orbital tooth, hind margin $\frac{3}{4}$ width of front, which is a little more than half greatest width of carapace, anterior margin of front slightly convex, rarely slightly sinuous, its antero-external angles quadrate but not sharply so; post-frontal lobes not very prominent, subequal or middle pair the larger. Chelipeds subequal, inner margin of 4th joint denticulate, but not expanded, and without spine, 5th joint without spine, inner and outer surface of hand granulate, upper margin with a nearly longitudinal sinuous ridge which is pectinate distally and granulate proximally, some additional short rows of granules, upper margin of finger with about 14 transversely-oval tubercles in proximal half and about 6 longitudinally-oval milled tubercles in distal half, transition between the two kinds gradual, the transverse tubercles symmetrical, but the longitudinal ones incline forwards (the distal slope shorter and steeper than the proximal slope), on the inner side proximally an irregular row of tiny granules, finger and thumb not gaping and not furry at junction; in ♀ similar but sculpturing on finger less distinct. 4th joints of legs with hind margin smooth. Length of 6th abdominal segment ♂ subequal to its distal width and half or not quite half its proximal width. Apex of 1st pleopod ♂ bent outwards.

Length 15 mm., breadth 19–20 mm. Brown, chelae of ♂ bright orange-red.

Localities.—Umbilo River, Natal (de Man); Delagoa Bay (Stebbing, as *catenata* part); Delagoa Bay and Beira (coll. K. H. B.).

Remarks.—Unless found in conjunction with their respective males, it seems impossible to distinguish the females of this species and *catenata*.

Gen. Cyclograpsus M. Edw.

1910. Stebbing, *l. c.*, p. 318.

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 325.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 125 (key to Indo-Pacific species).

Carapace broader than long, with convex (in *punctatus*) lateral margins, without tooth (or a very feeble one) behind outer orbital angle, front about half width of carapace, more or less deflexed, post-frontal lobes inconspicuous, dorsal regions ill-defined, no oblique lines (or only one short one in posterior third), pterygostomial regions with setae arranged in orderly lines but not so conspicuously reticulate as in *Sesarma*. Ant. 2 not excluded from orbit. Chelipeds robust, especially in ♂, subequal. Legs strong. Abdomen with 7 segments in both sexes, in ♂ not occupying whole space between bases of 5th legs, 7th segment in ♀ much wider than long, not embedded in 6th segment.

Remarks.—Littoral and estuarine. On the west coast of Africa *C. occidentalis* extends as far south as Angola (Rathbun, Bull. Amer. Mus. Nat. Hist., xliii, p. 455).

Cyclograpsus punctatus M. Edw.

Fig. 24, *f*.

1838. McLeay, Annulosa S. Afr., p. 65, pl. 3 (*Gnathochasmus barbatus*).

1843. Krauss, Südafrik. Crust., p. 45, pl. 3, fig. 3, *a–c* (*Sesarma barbata*).

1894. Ortmann, Semon's Austral. Reise, v, p. 57.

1910. Stebbing, *l. c.*, p. 318.

1914. Lenz and Strunck, D. Südpol Exp., xv, p. 283.

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 265.

1915. *Id.*, Ann. S. Afr. Mus., xv, p. 58.

1918. Rathbun, *l. c.*, p. 328, fig. 153 (mxp. 3) and pl. 99.

1918. Tesch, *l. c.*, p. 126 (in key).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 26.

1941. Broekhuysen, Trans. Roy. Soc. S. Afr., xxviii, pp. 331–366, figs., charts, pls. 56, 57 (life-history).

Carapace widest at anterior third (middle of gastric region), some

specimens as in McLeay's figure with sides behind the greatest width nearly parallel, whole carapace with a finely beaded rim, a deep groove from outer orbital margin below the antero-lateral margin, dorsal surface smooth and even, though somewhat uneven in large specimens, 6–8 small circular or oval depressions, 2 on each hepatic region, 2 on gastric region, and often 2 more behind the latter forming the ends of the gastric-cardiac groove (*cf.* McLeay's figure), often indistinct in small specimens, and in large ones often one or two additional pairs on the frontal and post-frontal region; the short (true) infra-orbital margin, the long anterior margin of the pterygostomial region and the oblique ridge across it, and the anterior margin of buccal cavity conspicuously granulate. Chelipeds smooth in ♂, in ♀ minutely granulate, chiefly on upper parts of wrist and hand, middle of inner surface of hand somewhat gibbous with 1–3 (or 4) low blunt tubercles, often inconspicuous, a moderate gap between bases of finger and thumb in ♂ and large ♀. Legs smooth, but in ♀ minutely granulate, chiefly on upper and lower margins of joints, patches of dark felt on upper and lower apex of 6th joint of 2nd leg, and on upper apices in 3rd–5th legs. 6 stripes of felt on dactyls of all legs, the 3 stripes on upper surface thicker than the others; legs otherwise glabrous. Abdomen of ♂ tapering from 3rd to 6th segment, distal angles of latter bevelled off, and 7th segment abruptly narrower. 1st pleopod ♂ stout, with setose lobe on inner edge, apex with 2 horny laminae, which are coalesced along outer margin, seminal canal opening between them.

Length up to ♂ 30 mm., ♀ 21 mm.; breadth ♂ 38 mm., ♀ 26 mm. Smallest ovigerous ♀ seen: 8 mm. in breadth. Greyish, buff, orange, salmon, deep red, brownish, greenish brown, violaceous, more or less mottled or speckled, chelipeds and legs uniform or more or less conspicuously spotted or speckled. Those living amongst rocks on the shore are lighter in colour; the brown, greenish, or violaceous tints are found in those burrowing in mud in estuaries (Krauss, and K. H. B.).

Localities.—Brak River, Uitenhage Division, and Natal (Krauss); Port Elizabeth (Ortmann); Simon's Bay (Stimpson); False Bay (Stebbing); Cape Town (Rathbun); Table Bay and Natal (Stebbing); Dyer's Island (Odhner); around whole coast from Port Nolloth on west coast to Durban and Uhlamli, Natal, and Zululand (S. Afr. Mus.).

Distribution.—Chile, Juan Fernandez, Indian Ocean, Hong Kong.

Remarks.—The Australasian *audouinii* (see Tweedie, Pap. Proc. Roy. Soc. Tasman. for 1941, p. 18, fig. 4, 1942) is very closely related to *punctatus* (the latter has line precedence) and, as Milne Edwards

himself said (1837, Hist. Nat. Crust., ii, p. 78), may only be a variety of *punctatus*. Balss (J. Roy. Soc. W. Austr., xxi, p. 142) records it as such. Rathbun (1918, *l. c.*, p. 329), however, gives some points of difference, which probably can only be appreciated by a direct comparison of specimens from both regions. As this author has compared Cape and Chilian specimens and pronounced them identical, it is probable that the Australian form does not merit specific rank, and that the species is circum-subantarctic, like *Plagusia chabrus* (*infra*) and the Crayfish *Jasus lalandei*.

This is one of the commonest shore-crabs around the South African coast, inhabiting both rocky coasts and muddy estuaries.

Broekhuysen found that the principal breeding season was in winter at the Cape.

Gen. Plagusia Latr.

1906. Laurie, Rep. Pearl Oyster Fish, Ceylon, pt. v, p. 429.
1910. Stebbing, *l. c.*, p. 322.
1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 331.
1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 128 (key to species).

Carapace subcircular, more or less depressed, interorbital space with 2 deep notches for reception of 1st antennae. Inter-antennular septum broad. Anterior margin of buccal cavity prominently projecting, crenate or dentate. Eye-stalks short and stout. 4th joint of mxp. 3 as broad as 3rd joint. Chelipeds and legs rugose-granulose, with furry grooves; the former robust in ♂, weak in ♀; legs strong, dactyls short, spinose. Abdomen with 7 segments, but in both sexes 3rd–5th segments may be more or less firmly coalesced. 1st pleopod ♂ stout.

Remarks.—The difference between the 1st pleopods ♂ of two apparently so closely allied species as *chabrus* and *depressa* is remarkable. In the former the course of the seminal groove (formed by the juxtaposition of the curled edges of the appendage) is nearly normal, *i.e.* on the inner and dorsal surfaces; but in *depressa* it takes a spiral course over the *ventral* surface and on to the *outer* surface before opening between the apical lobes (*cf.* fig. 26, *c*, *d*, and *h*).

Temperate and tropical seas, including the Mediterranean. Frequently found clinging to ships.

Key to the South African Species.

1. 4th joints of legs with one subapical tooth on upper margin
   Carapace squamose-tuberculate . . . . *depressa*.

2. 4th joints of legs with numerous teeth on upper margin.
Carapace smooth, covered with short pile . . . *chabrus.*

Plagusia depressa (Fabr.)

var. *tuberculata* Lam.

Natal Rock-crab.

Fig. 26, *g*, *h*.

1910. Stebbing, *l. c.*, p. 323 (*squamosa*).

1915. Kemp, Mem. Ind. Mus., v, p. 241.

1918. Rathbun, *l. c.*, pp. 332, 334, fig. 154, pls. 101, 102 (and var. *tuberculata*).

1918. Tesch, *l. c.*, p. 128 (in key, and footnote), p. 129 (var. *tuberculata*).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 22 (and var. *tuberculata*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*squamosa*).

Carapace moderately convex, covered (including gastric region) with conical or squamiform tubercles, each fringed anteriorly with short close-set bristles. Lobes on posterior margin of coxae of 3rd and 4th legs cut into 2–3 teeth (*depressa*) or entire (var. *tuberculata*). 4th joints of legs with a single subterminal tooth on upper margin; and a fringe of setae near both the upper and lower margins on the hinder surface. Wrist and hand of chelipeds rugulose-granulose, with setose grooves. Upper surface of hand with 3, of finger with 2, such grooves. 1st pleopod ♂, see *supra*, and fig. 26, *h*.

Length up to 54 mm., breadth 56 mm. Reddish, with darker blood-red dots and speckles.

Localities.—Mouth of Umlaas River (Krauss); Durban (Odhner); Isipingo, Natal (S. Afr. Mus.); Delagoa Bay (Barnard).

Distribution.—Typical *depressa*: both sides of Atlantic, west coast of Africa as far south as Port Alexander, Angola (Odhner), St. Helena.

var. *tuberculata*: Mauritius, east coast of Africa, Indo-Pacific, Chile.

Remarks.—Only var. *tuberculata*, distinguished by the entire coxal lobes, is found in the Indo-Pacific region. The use of Herbst's name *squamosa*, used by Alcock and Stebbing, has been criticized by Laurie (*l. c.*, pp. 429, 430).

Found on rocky coasts, and also on drift-wood, and clinging to ships.

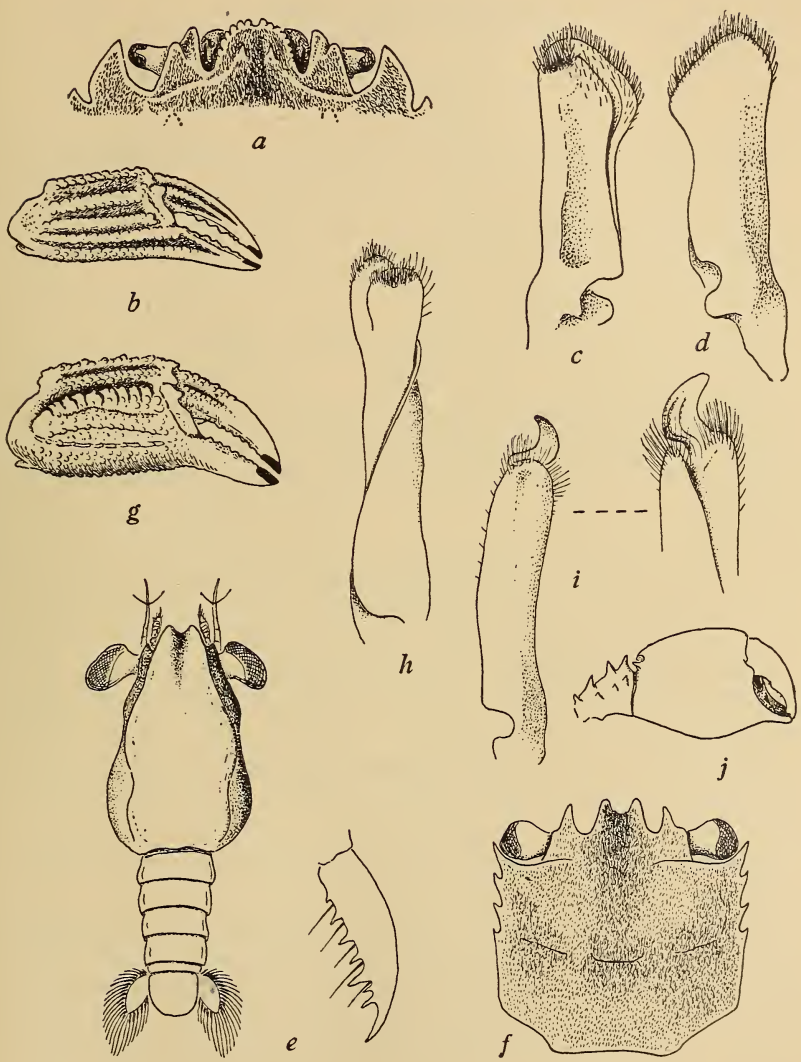


Fig. 26.—*Plagusia chabrus* (Linn.). *a*, front of carapace. *b*, outer surface of chela ♂. *c*, *d*, dorsal and ventral views of 1st pleopod ♂. *e*, Megalopa stage, with dactyl of walking leg. *f*, carapace of juvenile in 1st post-larval stage. *Plagusia depressa* (Fabr.). *g*, outer surface of chela ♂. *h*, ventral view of 1st pleopod ♂.
Percnon planissimum (Herbst). *i*, ventral view of 1st pleopod ♂, with dorsal view of apex. *j*, upper surface of left chela ♂.

Plagusia chabrus (Linn.)

Cape Rock-crab.

Fig. 26, *a–f.*

1838. McLeay, Annulosa S. Afr., p. 66 (*tomentosa* and *spinosa* = juv.).
1843. Krauss, Südafr. Crust., p. 42, pl. 2, fig. 6 (*tomentosa*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 809.
1905. Stebbing, Mar. Invest. S. Afr., iv, p. 47 (*capensis*, discussion of specific name).
1910. *Id.*, *l. c.*, p. 322.
1914. Lenz and Strunck, D. Südpol Exp., xv, 285.
1918. Rathbun, *l. c.*, p. 336, pl. 104.
1927. Hale, S. Austral. Crust., pt. 1, p. 185, fig. 186.
1929. Chilton and Bennet, Trans. N. Zeal. Inst., lix (1928), p. 774.
1942. Tweedie, Pap. Proc. Roy. Soc. Tasman. for 1941, p. 22, fig. 8 (*capensis*).

Megalopa stage.

Fig. 26, *e.*

1843. Krauss, Südafrik. Crust., p. 54 (*Megalops mutica*).
1852. Dana, U.S. Expl. Exp., xiii, p. 488, pl. 31, fig. 2, *a–i* (*Marestia elegans*).
1910. Stebbing, *l. c.*, p. 348 (*Marestia paederus*).
? 1918. Rathbun, Australas. Antarct. Exp. Rep., ser. C, v, pt. 2, p. 4, fig. 1 (*Marestia mawsoni*).
1930. Bennett, Rec. Canterb. Mus., iii, p. 257 (*Marestia mawsoni* = megalopa of *P. chabrus*).

Carapace slightly convex, smooth, non-tuberculate (1 tubercle behind orbit and 2–3 elongate ones near outer angle of branchial region: Rathbun's description of Australasian specimens; not seen in any South African specimens, except a faint indication of the post-orbital one in large examples (dotted in fig. 26 *a*)), covered with a fine close tomentum. Sternum, ventral surface of abdomen, and the grooves and depressed areas on legs and chelipeds also covered with tomentum. Posterior coxal lobes on 3rd and 4th legs each ending in a single sharp tooth. 4th joints of legs with a row of spines on upper margin, less strongly developed on 5th leg than on the preceding ones; and a fringe of setae near lower margin only. Wrist and hand of chelipeds tuberculate, tubercles longitudinally arranged on hand

and upper surface of fingers; upper and outer surface of hand with 6, of finger with 3, setose grooves. 1st pleopod ♂, see *supra*, and fig. 26, *c*, *d*.

Length up to 45 mm., breadth 50 mm. (a Tasmanian ♂ in S. Afr. Mus. measures 68 × 74 mm.). Deep reddish brown, the bare stripes on legs and margins of carapace brighter reddish than the parts covered with brown tomentum.

Localities.—Table Bay (Krauss, Lenz, Stebbing): Simon's Bay (Stimpson, Lenz and Strunck): East London (Stebbing); numerous localities around coast from Luderitzbucht and Port Nolloth on west coast to Port Shepstone, Natal, 0–35 fathoms (S. Afr. Mus.).

Distribution.—Chile, Juan Fernandez; S. and S.E. Australia, Tasmania, New Zealand.

Remarks.—This crab is the commonest shore-crab around the south-west coast, and is found on all rocky situations, clinging with great pertinacity and hiding in crevices; also on the jetties and quays in docks, and on ships' bottoms.

The life-history has not been studied, but there is no doubt that the large Megalopas found so abundantly in in-shore waters, and washed up on the beach together with very small post-larval stages, are the early stages of this species. These Megalopas have been found in the months of April, June, August, and September, especially the latter two months. Some were taken from the stomach of a Sun-fish (*Ranzania truncata*) stranded on the Cape Peninsula in August 1934.

The Megalopa measures 6–7 mm. in length and 4–5 mm. in width. The front is prominent and deeply grooved above, and almost vertically deflexed. The notches for the 1st antennae lie at a lower level laterally. The upper and outer surface of the hand of cheliped shows indications of the same ridges and grooves as are found in the post-larval and adult stages. Similar indications are found on the 6th and, less conspicuously, on the 5th joints of the legs. The dactyls are strong with 6–7 teeth, of which the 4th or 5th is larger than the others; long setae in the intervening notches (fig. 26, *e*).

The smallest crabs, exhibiting the adult form, measure 6 × 6 mm., and represent presumably the 1st post-larval stage. The carapace is approximately square, the outer orbital teeth projecting laterally slightly farther than the dentate lateral margins. Except at the margins the carapace is covered with fine pile (fig. 26, *f*) (cf. *spinosa* McLeay).

Marestia mawsoni Rathbun 1918 is probably the Megalopa of this species, as already suggested by Bennett (1930).

Gen. Percnon Gistel

1900. Alcock, J. Asiat. Soc. Bengal lxix, p. 439 (*Liolophus*).

1910. Stebbing, *l. c.*, p. 324.

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 337.

1918. Tesch, Siboga Exp. monogr., xxxix *c*, p. 129.

1939. Schmitt, Smithson. Misc. Coll., xcviii, 6, p. 23 (key to species).

Carapace subcircular, strongly depressed, inter-orbital space with 2 deep notches for 1st antennae. Inter-antennular septum narrow. Epistome linear. Anterior margin of buccal cavity a toothed ridge, not prominently projecting. Eye-stalks very short and stout. 4th joint of mxp. 3 much smaller and narrower than 3rd. Chelipeds and legs spinose, but not rugose; legs slender, especially the distal joints. Abdomen with 5 segments in both sexes, segments 3–5 being completely fused. 1st pleopod ♂ ending in a hook.

Percnon planissimum (Herbst)

Fig. 26, *i*, *j*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 809.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 543, pl. 20, fig. 12 (*Liolophus p.*), and pp. 544, 545 (contrast with *abbreviatum*).

1910. Stebbing, *l. c.*, p. 324.

1917. *Id.*, Ann. Durban Mus., ii, p. 11.

1918. Tesch, *l. c.*, p. 130.

1929. Hale, Trans. Roy. Soc. S. Austral., liii, p. 70, pl. 5.

1942. Ward, Mauritius Inst. Bull., ii, p. 108.

Carapace dorsally covered with short close tomentum, leaving margins and certain slightly raised stripes bare; whole ventral surface, sternum, abdomen, chelipeds, and legs glabrous; upper surface of legs with alternate bare and tomentose stripes. A flat, but sharp-pointed tubercle behind each orbit. Anterior margin of buccal cavity with a sharp median spine, and one at each lateral corner. Edge of the pleural groove across pterygostomial region fringed with setae. Chelipeds with spines on upper and outer border of 4th and 5th joints, one spine at upper outer basal corner of hand directed proximally, hand smooth, not sulcate on upper border, and without tuft of setae on inner surface, feebly enlarged in ♀, but strongly so in ♂. 4th joints of legs with row of spines on front margin, with a subsidiary

submarginal row of denticles, and fringes of hairs near both front and hind margins. Abdomen of ♂ broad, 7th segment subtriangular.

Length 25 mm., breadth 23 mm. Reddish or orange brown, the margins and bare stripes on carapace and legs brighter, a median dorsal stripe and an oblique stripe on each side of it emerald green, suborbital ridge and anterior margin of buccal cavity also emerald green, joints of legs and some patches or bands on the 4th joints buff, lower half of eyes bright red, ventral surface of carapace and legs pale creamy (K. H. B.) (*cf.* also Krauss, Stimpson, Stebbing).

Localities.—Mozambique (Hilgendorf); Durban (Krauss, Stebbing); Scottburgh, Isipingo, Durban, Port St. Johns (S. Afr. Mus.).

Distribution.—Mauritius, Amirante Is., east coast of Africa, Indo-Pacific. Rathbun (1918, *l. c.*, p. 337) now regards the Atlantic form, *gibbesi* (M. Edw.), as distinct from the Indo-Pacific form, but does not discuss the differences. Bouvier (1922, Res. Sci. Camp. Monaco, lxii, p. 75) records a specimen from Grand Salvage (N. des Canaries) as Herbt's species.

Remarks.—Krauss' record from Table Bay is not acceptable; this species has not since been found anywhere on the Cape coast, and it is very unlikely that it occurs here except as a casual inhabitant of a ship's hull in transit.

This crab is exceedingly quick and difficult to catch, because, when a rock is lifted up, it slides away underneath, and gets into narrow crevices from which it is with difficulty dislodged, and then only with the loss probably of most of its legs. In form and movements it is thus analogous to the terrestrial crab-spider (*Selenops*).

Family PORTUNIDAE.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 483 (key to subfamilies).

1910. Stebbing, *l. c.*, p. 305.

1927. Palmer, J. Mar. Biol. Assoc. Plym., n.s., xiv, p. 877 (revision of "Portunus," discussion of name).

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 13.

Carapace depressed or slightly convex (seldom strongly convex), usually wider than long, and widest at the last antero-lateral tooth, front broad, not deflexed, usually cut into lobes or teeth. The 5th pair of legs, with few exceptions, natatorial, with at least the last 2 joints flattened, broad, strongly fringed with hairs. Male genital

openings coxal. Eye-stalks short, except in *Podophthalmus*, where they are very elongate (cf. *Ommatocarcinus*, *Goneplacidae*).

Remarks.—The great majority of crabs of this family are at once recognized by the paddle-like last pair of legs. One of the exceptions, in which the dactyls of this pair of legs are acutely lanceolate and not distinctly natatorial, is *Carcinides maenas* (Linn.), a common edible shore crab in Europe and North America. This crab has also been found in the Suez Canal and Red Sea, Ceylon, Australia, and Hawaiian

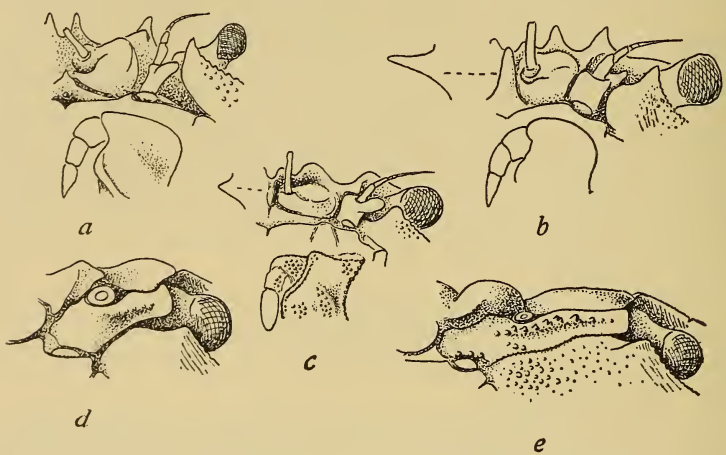


Fig. 27.—Ventral views of front. In *a–c* the 2nd antenna enters the orbit; in *d*, *e*, the apical process of the basal joint excludes the rest of the antenna (cut off and represented by an oval blank space) from the orbit. 3rd maxilliped shown in *a–c*.

a, *Ovalipes punctatus* (de Haan). *b*, *Lupa pelagica* (Linn.). *c*, *Monomia argentata* (White, M. Edw.). *d*, *Charybdis merguiensis* (de Man). *e*, *Thalamita crenata* (Latr.) M. Edw.

Islands; it may eventually find its way to South Africa (see Rathbun, *l. c.*, p. 15, fig. 4, also Chopra and Das, Rec. Ind. Mus., xxxix, 1937, pp. 381, 391.

The family has been divided into subfamilies, but as these have been employed with different connotations by various authors (Alcock, Borradaile, Rathbun) they are not indicated here.

Key to the South African Genera.

I. Basal joint of ant. 2 narrow, without apical process (figs. 28, *i*, 29, *f. j*).

A. Front with median tooth (fig. 28, *a*, *g*).* Ant. 1 oblique.

1. 5th pair of legs not natatorial . . . [*Carcinides*].

* But see *Lissocarcinus Laevis*.

2. 5th pair of legs natatorial. 5 antero-lateral teeth (incl. outer orbital tooth).
   a. Flagellum of ant 2 entering orbit (*cf.* fig. 27, *a–c* . . . . . *Portumnus.*
   b. Flagellum of ant. 2 excluded from orbit (*cf.* fig. 27, *d*) . . . . *Lissocarcinus.*

B. Front with median notch (figs. 28, *h*, 29, *e*, *i*). Ant. 1 transverse.
1. Carapace with 9 antero-lateral teeth.
   a. Antero-lateral teeth subequal (fig. 28, *h*). 4th joint of 5th leg without spine on hind margin . . . . . *Carupella.*
   b. Antero-lateral teeth alternately larger and smaller (fig. 29, *e*). 4th joint of 5th leg with spine on hind margin (fig. 29, *h*) . . . . . *Lupocyclus.*
2. Carapace with 5 antero-lateral teeth . . *Parathranites.*

II. Basal joint of ant. 2 moderately broad or very broad, with apical process (figs. 27, *a–e*, 31, *e*).

A. Flagellum of ant. 2 entering orbit (figs. 27, *a–c*, 31, *e*).
1. 5 antero-lateral teeth. Basal joint of ant. 1 visible dorsally (fig. 29, *a*) . . . *Ovalipes.*
2. 9 antero-lateral teeth. Basal joint of ant. 1 not visible (figs. 30, *a*, *e*, 31, *a*, *b*).
   a. Chelipeds elongate, hand costate.
      i. 4th joint of mxp. 3 apically rounded (fig. 27, *b*). Dactyl of 5th leg glabrous . . . . *Lupa.*
      ii. 4th joint of mxp. 3 apically square and produced outwards (figs. 27, *c*, 31, *g*).
         α. 9th antero-lateral tooth much larger than the others. Carapace subhexagonal (figs. 30, *a*, *e*). Dactyl of 5th leg with pilose stripes (fig. 30, *d*).
            * Postero-lateral angles of carapace rounded . *Monomia.*
            ** Postero-lateral angles spiniform . . . *Hellenus.*
         β. 9th antero-lateral tooth not larger than others. Carapace subcircular (fig. 31, *a*). Dactyl of 5th leg glabrous . *Achelous.*
   b. Chelipeds robust, hand inflated and smooth (not costate) . . . . . *Scylla.*
3. 6 antero-lateral teeth (fig. 31, *d*, *j*) . . . *Gonioneptunus.*

B. Flagellum of ant. 2 excluded from orbit by process of the very broad basal joint (fig. 27, *d*, *e*).
1. Distance between outer orbital teeth considerably less than greatest width of carapace; 6 antero-lateral teeth (2nd sometimes small) (fig. 32) . . . . . *Charybdis.*
2. Distance between outer orbital teeth not much less than greatest width of carapace; 5 antero-lateral teeth (4th often small or obscure) (fig. 33) . . . . . *Thalamita.*

Gen. Portumnus Leach

1853. Bell, Brit. Stalk-eyed Crust., p. 82.
1910. Stebbing, *l. c.*, p. 305.

Carapace nearly as long as broad or longer than broad, front with median tooth, antero-lateral margin with 5 teeth. Ant. 1 oblique; ant. 2 not excluded from orbit, basal joint narrow. Upper margin of orbit with 1 or 2 fissures. Eye not larger than eye-stalk, which is slightly curved. 5th leg with 6th and 7th joints expanded, the latter rather narrow, ovate-lanceolate, apically acute or subacute, with or without distinct unguis. Abdomen with 5 segments in ♂, the ultimate segment not abruptly narrower than penultimate, in ♀ with 7 segments, 2nd–4th short, 6th and 7th evenly tapering.

Key to the South African Species.

1. Carapace slightly broader than long, with transverse ridges or rows of tubercles. Hand of cheliped with 3 ridges on outer upper surface . . . . . *biguttatus.*
2. Carapace about as broad as long, smooth. Hand of cheliped with one ridge on outer upper surface . . . *mcleayi.*

Portumnus biguttatus Risso.

Fig. 28, *e*, *f*.

1816. Risso, Hist. Nat. Crust., p. 31 (*Portunus b.*).
1825. Latreille, Encycl. Meth., x, p. 151 (*Platyonichus nasutus*).
1838. McLeay, Annulosa S. Afr., p. 62, pl. 3 (*Xaiva pulchella*).
1894. Ortmann, Semon's Austral. Reise, v, p. 44 (*pulchellus*).
1897. Garstang, J. Mar. Biol. Assoc., n.s., iv, p. 402.
1902. Bohn, Bull. Sci. Fr. Belg., xxxvi, p. 447 (*Portumniodes garstangi*).
1910. Stebbing, *l. c.*, p. 305 (*pulchellus*).

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 56 (*pulchellus*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Carapace slightly broader than long, front prominent, with blunt median tooth, sides undulate, antero-lateral margin with 4 teeth behind the broad feebly bilobed outer orbital tooth, a small tooth on upper orbital margin external to the fissure, a transverse row of 8 rounded tubercles across middle of gastric and hepatic regions, and an interrupted ridge between the last antero-lateral teeth across hinder part of gastric and epibranchial regions. Outer surface of 3rd and 4th joints of mxp. 3 glabrous, but anterior margin of 4th joint with conspicuous bristles. Cornea ovoid, with small apical tubercle. Cheliped, wrist with a triangular tooth on inner upper margin and 3 ridges on upper surface, hand with keeled inner upper margin, and 3 ridges on upper half of outer surface, finger and thumb ridged and grooved, apices crossed; tufts of bristles along inner upper margin (sub-marginal) of wrist and hand, and lower inner margin of hand. 5th leg with 6th joint ovate, 7th lanceolate, nearly 3 times as long as broad, with distinct acute unguis. 1st pleopod ♂, see fig. 28, *f*.

Length up to ♂ 22 mm., ♀ 21 mm., breadth ♂ 25 mm., ♀ 24 mm. Pinkish with deeper orange-red irroration and speckling, some small dark red circular spots in various places, 2 on the cardiac region being the only ones which are symmetrical (in S. Afr. Mus. specimens).

Localities.—Port Elizabeth (Ortmann). Swakopmund and Luderitzbucht (Balss); Lambert's Bay, Dassen Island, Wilderness (George district), Port Elizabeth, Port Alfred, littoral (S. Afr. Mus.).

Distribution.—Plymouth, west coast of France, Mediterranean, Cape Verde Is.

Remarks.—Milne Edwards (1861) remarked that *pulchellus* was closely related to *biguttatus*. Balss (1921) kept them separate. Dr. Gordon, to whom I owe the above references, regards them as identical (in litt. 18/vi/37).

Portumnus mcleayi Brnrd.

Fig. 28, *a–d*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Carapace about as broad as long, or slightly longer than broad, smooth except for 4 or 6 very low and obscure tubercles in middle, minutely granulate and with scattered pits; front prominent, blunt with undulate sides, antero-lateral margin with 4 teeth behind the incurved outer orbital tooth, the 1st low and truncate, the others

triangular; upper orbital margin with 2 small fissures but no tooth. Inner margin of 3rd and 4th joints, outer surface of 4th joint, and palp of mxp. 3 densely setose. Cornea globular. Cheliped, wrist

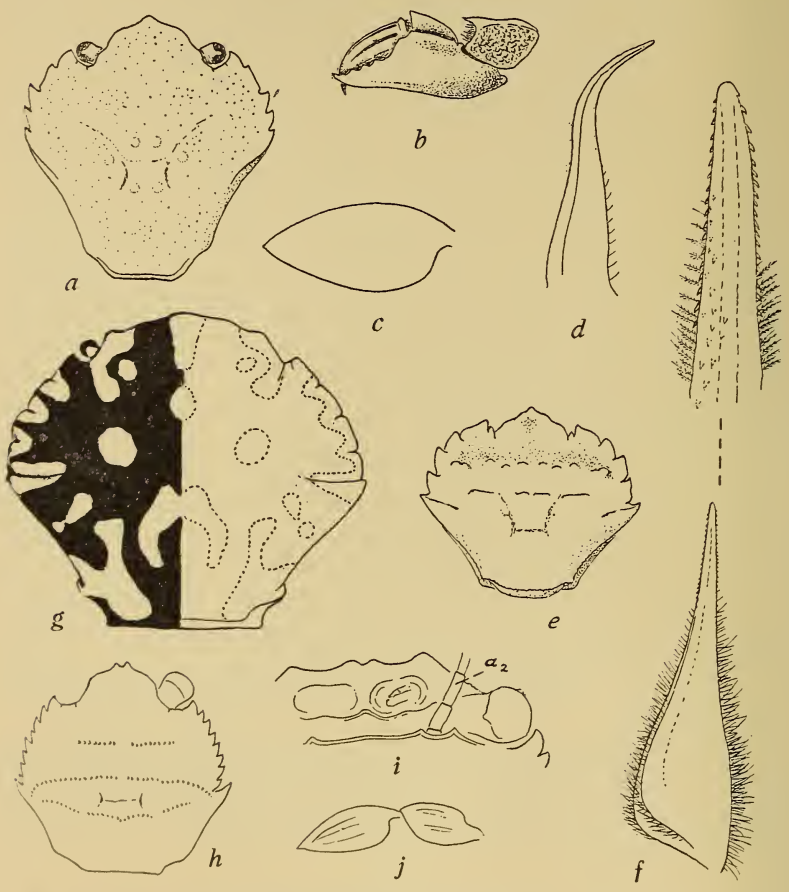


FIG. 28.—*Portumnus mcleayi* Brnrd. *a*, carapace. *b*, outer view of chela. *c*, dactyl of 5th leg (marginal setae omitted). *d*, 1st pleopod ♂.
Portumnus biguttatus Risso. *e*, carapace. *f*, 1st pleopod ♂, with apex further enlarged, ventral view, spines on dorsal surface dotted.
Lissocarcinus orbicularis Dana. *g*, carapace (the dark area on left side is maroon in life).
Carupella natalensis Lenz. *h*, carapace. *i*, ventral surface of front. *j*, 5th leg. (*h–j* after Lenz.)

granulate externally, with sharp tooth on inner upper margin, hand smooth, glabrous, inner upper edge sharply keeled, a low ridge on outer upper surface, finger grooved on upper and outer surfaces,

finger and thumb apically crossed. 5th leg with 7th joint ovate-lanceolate, twice as long as broad, apex subacute, without distinct unguis.

Length up to 13 mm., breadth 13 mm.

Localities.—Algoa Bay to Port Shepstone (Natal), 24–27 fathoms (S. Afr. Mus.).

Remarks.—Quite distinct from the species described by McLeay, which seems to be a purely littoral form.

Gen. Lissocarcinus Ad. & White

1848. Adams and White, Voy. "Samarang," Crust., p. 45.
1877. Streets, Bull. U.S. Nat. Mus., vii, p. 110 (*Assecla*).
1886. Miers, *Challenger* Rep., xvii, p. 204.
1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 18.
1923. Kemp, Rec. Ind. Mus., xxv, p. 405.
1931. Chopra, *ibid.*, xxxiii, p. 307.

Carapace not or very little broader than long, smooth, or with a single ridge running inwards from last antero-lateral tooth, or with numerous transverse grooves; front prominent, with or without median notch; antero-lateral border not strongly arched, cut into 5 more or less distinct blunt teeth or lobes (incl. outer orbital angle). Basal joint of ant. 2 not very broad, outer apex produced in a lobe meeting the front and excluding flagellum from orbit. Chelipeds short, but a little longer than legs. Abdomen in ♂ with 3rd–5th segments fused.

Lissocarcinus orbicularis Dana

Fig. 28, *g*.

1852. Dana, Proc. Ac. Nat. Sci. Philad., p. 86, and U.S. Expl. Exp. Crust., pt. 1, p. 288, pl. 18, fig. 1, *a–e*.
1887. Müller, Verh. Nat. Ges. Basel, viii, pp. 475, 482, pl. 5, fig. 6 (*pulchellus*).
1899. Alcock, *l. c.*, p. 20.
1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 200.
1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 868.
1911. *Id.*, Trans. Linn. Soc. Lond., xiv, p. 204.
1931. Chopra, *l. c.*, pp. 310, 311.
1942. Ward, Mauritius Inst. Bull., ii, p. 81 (*pulchellus*) (reference to Müller's fig. is given as "pl. 1, figs. 6–6, *b*").
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Carapace slightly broader than long, convex, with thin edges, smooth, glabrous, a more or less distinct ridge from last antero-lateral tooth, front not medianly notched, antero-lateral margin with very shallow notches or clefts separating the 5 broad flat lobes. Chelipeds, inner angle of wrist with blunt tooth, 2 low somewhat oblique ridges on upper and outer surfaces, hand with 2 ridges on upper surface, a blunt tubercle at base of outer one, an obscure ridge on middle of outer surface, finger with upper margin sharply keeled, tips of finger and thumb acute, crossing. Legs stout, dactyl of 5th leg with sharp ungual point.

Length up to 10 mm., breadth 11·5 mm. Carapace maroon or chocolate-coloured, with yellow or creamy clearly defined markings; chelipeds and legs banded, dactyls of 2nd–4th legs dark, dactyl of 5th leg dark in basal half, white in distal half; sternum and abdomen (♀) paler maroon or chocolate, 3 cream longitudinal bands distinct on proximal segments but passing into the general paler tint of the two distal segments.

Locality.—Delagoa Bay (coll. Dr. C. J. van der Horst, 1 ♀, 1939).

Distribution.—Maldive and Laccadive Archipelago; Chagos; Seychelles; Hawaiian Is.

Remarks.—Usually found associated with Holothurians (Borradaile, *l. c.*). *L. holothurica* (Streets) 1877 is possibly synonymous. *L. ornatus* Chopra 1931, from the Andaman Is., and also found in a Holothurian, is probably also synonymous. The front as shown in Chopra's figure seems to be asymmetrically and presumably abnormally notched. The relative proportions of light and dark colouring: light markings on a dark ground as in *orbicularis*, *holothurica*, and the Delagoa Bay specimen, or dark markings on a light ground as in *ornatus*, is probably not a specific character. When material is available the 1st pleopods of ♂ might be compared.

See Addenda.

Gen. Carupella Lenz

1914. Lenz in Lenz and Strunck, D. Südpol Exp., xv, p. 278.

Carapace as long as broad, front with median notch, antero-lateral margin with 9 teeth (incl. outer orbital tooth). Ant. 1 transverse; ant. 2 not excluded from orbit, basal joint narrow. 4th joint of mxp. 3 as in *Lupa*. Upper margin of orbit with 2 fissures. Cornea globular. Chelipeds not elongate or slender. 5th leg with 6th and 7th joints expanded, latter ovate-lanceolate. Abdomen of ♂ with 5 segments, tapering.

Carupella natalensis Lenz

Fig. 28, *h–j*.

1914. Lenz in Lenz and Strunck, *l. c.*, p. 279, pl. 12, figs. 8–16.

Carapace flat, smooth, frontal and upper orbital margin finely granulate, 3 transverse rows of granules, front prominent, apically notched, margins undulate, 8 somewhat unequal teeth behind the outer orbital tooth, the last but one the smallest, the last one the largest. Cheliped, 4th joint with 3 serrations on inner margin, hind margin unarmed, wrist with a sharp spiniform tooth on inner margin and 3 rows of granules each ending in a flattened denticle on outer surface, hand with a flat tooth proximally and 2 double rows of granules each ending in a flat tooth on upper surface, outer surface with 3 smooth ridges, finger and thumb apically crossing. Legs, 4th joints without spine on hind margin; dactyl of 5th leg ovate-lanceolate. 2nd and 3rd abdominal segments transversely keeled.

Length 15 mm. (indirectly stated in comparison with *Lupocyclus rotundatus*).

Locality.—Natal (Lenz).

Remarks.—This species is compared and contrasted with *Lupocyclus rotundatus* and *whitei*. Lenz had only ♂♂.

Gen. Lupocyclus Ad. & Wh.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 22.

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 869.

1937. Shen, Bull. Raffles Mus., no. 13, p. 98.

1938. Gordon, *ibid.*, no. 14, p. 175.

1942. Ward, Mauritius Inst. Bull., ii, p. 41.

Carapace subcircular, or a little broader than long, convex, with granular ridges and elevations, tomentose, front prominent, cut into 4 teeth, not including the rounded and ill-defined inner orbital tooth; antero-lateral margin with 5 major teeth (incl. outer orbital tooth) and a smaller denticle in each intervening notch (*i.e.* 9 in all), some or all of these denticles sometimes obscured (and easily overlooked) by the marginal setae; upper orbital margin with 2 fissures. Cornea globular. Basal joint of ant. 2 not very stout, without apical process, not excluding rest of antenna from orbit. Chelipeds longer than legs, often rather slender. Legs slender, 4th joint of 5th leg with spine on hind margin, dactyl ovate. Abdomen of ♂ with 5 segments, 2nd and 3rd segments keeled.

Lupocyclus tugelae n.sp.

Fig. 29, *e–h.*

♀. Only one transverse granular ridge, viz. across the branchial region; an oblique line of granules near postero-lateral corner; gastric, cardiac, and branchial regions, and antero-lateral margins with *groups* of granules, which are closely aggregated and often sub-imbricate; granules of the branchial ridge pointing forwards and appearing as elongate granules. Chelipeds missing. Anterior margin of 4th joint of mxp. 3 flatly rounded. Basal joint of ant. 2 longitudinally grooved where it fits against the suborbital tooth.

Length 11 m., breadth 15 mm.

Locality.—Off Tugela River mouth, 36 fathoms (S. Afr. Mus.).

Remarks.—Distinguished apparently from other described species by having clusters of granules instead of transverse granular ridges; but it may nevertheless be only a variant of *rotundatus* Ad. & Wh. (for figure of carapace see Shen, *l. c.*; and of ♂ abd. Gordon, *l. c.*). Only the one non-ovigerous ♀ was taken by the s.s. *Pieter Faure*; in the same haul were numerous examples of *Gonioneptunus africanus.*

Gen. Parathranites Miers

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 237.

Carapace broader than long, convex, with well-defined regions and tubercles, front not prominently projecting, cut into 4 teeth, antero-lateral margin with 5 teeth (incl. outer orbital angle); the last one projecting laterally, upper orbital margin with 2 fissures. Ant. 1 transverse; basal joint of ant. 2 narrow. 4th joint of mxp. 3 produced in a rounded lobe beyond insertion of palp. Chelipeds spinose. Legs slender, dactyl of 5th leg broadly ovate. Abdomen of ♂ with 5 segments (3rd–5th fused, but positions of sutures indicated), tapering.

Parathranites orientalis Miers

Fig. 29, *i–l.*

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 204.

1920. Stebbing, *l. c.*, p. 238.

Carapace granulate, one small tubercle on each anterior gastric region, one larger median one in middle of gastric region, one on each branchial region in line with the gastric tubercle and last lateral tooth,

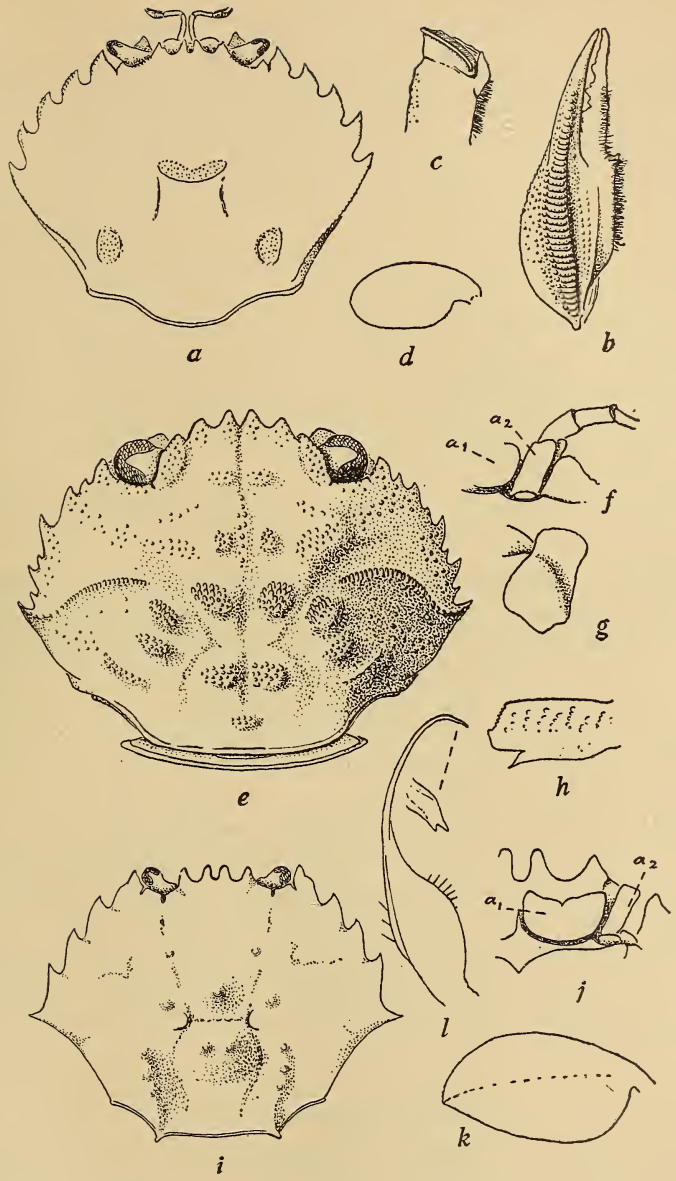


FIG. 29.—*Ovalipes punctatus* (de Haan). *a*, carapace, red marks dotted. *b*, lower surface of chela, showing stridulating rasp. *c*, apex of 4th joint of 2nd leg, showing stridulating ridge. *d*, dactyl of 5th leg, marginal setae omitted.

Lupocyclus tugelae n.sp. *e*, carapace, tomentum removed (4th tooth obsolete on left side). *f*, ventral view of base of ant. 2. *g*, 4th joint of mxp. 3 (with base of 5th). *h*, 4th joint of 5th leg.

Parathranites orientalis Miers. *i*, carapace. *j*, ventral view of front with bases of ant. 1 and 2. *k*, dactyl of 5th leg, marginal setae omitted. *l*, 1st pleopod ♂.

2 side by side transversely on cardiac region (Alcock: sometimes only one), just external to the cardiac-branchial groove a longitudinal ridge with small tubercles (anterior one the largest) and extending posteriorly to a sharp, slightly up-turned point on hind margin, which is nearly straight. Cheliped, 4th joint with one spine on inner margin and one (Miers: 2) on hind margin, wrist with one large spine on inner margin and 2–3 smaller ones on outer surface, hand with one spine on upper margin at base and 2 distally. Legs smooth, 4th joint of 5th leg twice as long as broad. dactyl ovate, twice as long as broad, upper and lower surfaces glabrous. Abdomen with 2nd and 3rd segments transversely keeled, terminal segment longer than broad, and a little narrower at base than distal margin of penultimate segment. Sternum of ♂ hollowed between bases of chelipeds.

Length 12·5–13 mm., breadth 18–19 mm. (incl. lateral spines). (Miers gives 15 × 18 mm. to base of lateral spines.) Salmon-pink (Alcock).

Locality.—Off Umhloti River mouth, Natal, 100 fathoms (Stebbing).

Distribution.—Kei and Admiralty Is., 140–150 fathoms; Malabar and Coromandel coasts, 33–68 fathoms; Andaman Is.; Seychelles.

Gen. Ovalipes Rathbun

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 12.

1910. *Id.*, *l. c.*, p. 305.

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 18.

Carapace a little broader than long, front not prominent, cut into 3 or 4 teeth, antero-lateral margin with 5 teeth (incl. outer orbital angle). Basal joint of ant. 1 advanced, and visible dorsally between the frontal teeth. Ant. 2 entering orbit, basal joint broad. Cornea ovoid, not wider than eye-stalk, which is slightly curved. Dactyl of 5th leg broadly oval, apically rounded. Abdomen of ♂ oblong, with 5 or 7 segments.

Ovalipes punctatus (de Haan)

Red Spot Swimming-crab.

Figs. 27, *a*, 29, *a–d.*

1838. McLeay, Annulosa S. Afr., p. 62 (*Anisopus trimaculatus*).

1894. Ortmann, Semon's Austral. Reise, v, p. 44 (*Platyonychus bipustulatus*).

1910. Stebbing, *l. c.*, p. 306 (*trimaculatus*).

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 57 (*trimaculatus*).

1924. Balss in Skottsberg. Nat. Hist. Juan Fernandez and Easter Is., iii. p. 336 (date *apud* Zool. Rec., 1929).

1927. Hale, Crust. S. Austral., pt. 1, p. 147, fig. 148 (*bipustulatus*).

1929. Chilton and Bennett, Trans. N. Zeal. Inst., lix (1928), p. 755 (*bipustulatus*).

1930. Rathbun, *l. c.*, p. 24, pls. 5–8.

Carapace finely granulate, front with 4 teeth, a tooth on upper orbital margin, and 4 teeth on antero-lateral margin behind outer orbital tooth, lateral margins converging posteriorly, hind margin arcuate. No stridulating ridge on pterygostomial region (only a line of small granules and a furry band). Cheliped with fringe of shaggy hair on inner side of upper margin, outer surface of wrist and hand granulate, upper and outer surface of hand with 5 ridges, the uppermost ending in a spine, the lowermost feeble, 2 feeble ridges on middle of inner surface, lower surface with a series of transverse granulate rugae (fig. 29, *b*), finger with 3 granulate or denticulate ridges distally. 2nd leg with a transverse horny ridge on distal margin of 4th joint (fig. 29, *c*), antagonizing against the rugae on cheliped to form a stridulating mechanism, especially well developed in old ♂♂; dactyl in adult ♂ larger than that of 3rd or 4th legs, falcate, its upper edge deeply grooved; dactyl of 5th leg regularly oval, scarcely twice as long as broad, upper and lower surfaces glabrous. Abdomen ♂ with 7 segments, 2nd and 3rd transversely keeled.

Length up to ♂ 55 mm., ♀ 42 mm., breadth ♂ 70 mm., ♀ 54 mm. (Rathbun gives 85 × 109·5 mm. for an Argentine ♂). Creamy-grey or pale buff, speckled with reddish dots, a median crescentic red mark and an oval red spot near each postero-lateral corner, hands of chelipeds tinged with red or pink inside surface (K. H. B.). Stimpson (1907) and Hale (*l. c.*) give the colour of the three marks as blue and violet respectively in Japanese and South Australian examples. I have never seen South African specimens with other than red or russet-red spots, and Krauss gave the same colour.

Localities.—Table Bay (Krauss, Rathbun); Port Elizabeth (Ortmann); Simon's Bay (M. Edwards); False Bay (Stebbing); Agulhas Bank and Algoa Bay, 40–80 metres (Doflein); Luderitzbucht, 0–10 metres (Balss); Table Bay, and False Bay to Port St. Johns, 0–50 fathoms (S. Afr. Mus.).

Distribution.—Juan Fernandez, Peru, Chile, Uraguay, Argentine, China, Japan, South and South-east Australia, New Zealand.

Remarks.—Hale's statement that the carapace is "longer than

wide" would appear to be a slip. The smallest specimen I have seen measures 6·5 mm. in length by 7·5 mm. in breadth. At this size the rugae on lower surface of chela are already present, but the horny ridge on 4th joint of 2nd leg does not reach its full development until maturity, and even then is not nearly so strongly developed in ♀♀ as in large ♂♂.

Doflein (1904) describes and figures (photographically) the dactyl of 5th leg of juveniles 7 mm. in length as finely pointed. Enlargement of the photograph shows that the appearance is mainly due to matting together of the apical setae, though it is true that the apex is less broadly rounded than in the adult.

Common in sandy bays, and buries itself rapidly after being disturbed.

Gen. Lupa Leach

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 11.

1908. *Id.*, Ann. S. Afr. Mus., vi, p. 11.

1910. *Id.*, *l. c.*, p. 307.

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 33 (*Portunus* Weber, Fabr. non Leach).

Carapace glabrous, moderately or very broad, including the lateral spines as much as twice as broad as long, little convex, front with 3–6 teeth (usually 4) excluding inner orbital teeth, antero-lateral margin with 8 teeth behind outer orbital tooth, the last one strong and projecting laterally, postero-lateral angles rounded. Upper orbital margin usually with 2 fissures. Ant 1 transverse; basal joint of ant. 2 short and broad, its outer apex produced in a more or less spiniform process entering the orbit but not excluding rest of antenna from orbit (fig. 27, *b*). Antero-external margin of 4th joint of mxp. 3 rounded, not produced (fig. 27, *b*). Epistome produced in a strong spine between bases of ant. 1 (fig. 27, *b*). Chelipeds elongate, usually longer than legs. Legs compressed; distal margin of 4th joint of 5th leg smooth; dactyl of 5th leg ovate, upper and lower surfaces of 6th joint and dactyl of 5th leg glabrous. Abdomen of 5 segments in ♂, triangular and evenly tapering.

Key to the South African Species.

1. A spine at end of hind margin of 4th joint of cheliped. Carapace reticulated and mottled . . . . . *pelagica.*
2. No spine on hind margin of 4th joint of cheliped. Carapace with 3 red spots near hind margin . . . . *sanguinolenta.*

Lupa pelagica (Linn.)

Blue Swimming-crab; Chinaman.

Fig. 27, *b*.

1878. Hilgendorf, MB Ak. Wiss. Berlin, pp. 799 and 849 (native name).

1910. Stebbing, *l. c.*, p. 307.

? 1921. *Id.*, Ann. Durban Mus., iii, p. 13 (*pubescens*, ? non Dana).

1927. Hale, S. Austral. Crust., pt. 1, p. 149, fig. 150 (*Portunus p.*).

1930. Monod, Zool. Anz., cxii, p. 140, fig. 6 (*Neptunus p.*).

1932. Shen, Hong Kong Natural., iii, p. 32, fig. 1 and pl. 6 (*Portunus trituberculatus*).

1932. *Id.*, Zool. Sinica, ix, p. 64, figs. 37, 38, and pl. 4, fig. 1 (*Portunus trituberculatus*).

1934. *Id.*, Hong Kong Natural., Suppl. no. 3, p. 37, fig. 1.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 63, pls. 21–24 (*Neptunus p.*).

1935. Chopra, Rec. Ind. Mus., xxxvii, p. 476, fig. 3 (1st plp. ♂) (*Neptunus p.*).

1942. Ward, Bull. Mauritius Inst., ii, p. 79, pl. 5, fig. 4 (*Portunus mauritianus*).

1945. Stephensen, Dan. Sci. Invest. Iran. pt. 4, p. 124, fig. 26, E (plp. 2 ♂).

Carapace about twice as broad as long (incl. lateral spines), granulate, 2 humps on cardiac and one on hinder gastric region, but these variable in size and distinctness, front with 4 teeth but the middle pair often small, or confluent, or obsolete; a transverse granular line across gastric region, and another across branchial region from the large lateral spine. Upper orbital margin with 2 fissures, the outer corner of the lobe between them often dentiform. Chelipeds, 4th joint with 3–4 spine-teeth on front margin, and one distally on hind margin, hand with granulate costae and 3 spines, one at base and 2 distally. A small spine at apex of hind margin of 5th joint of 2nd and 3rd legs.

Length up to 74 mm., breadth (incl. spines) 162 mm. Carapace, chelipeds, and 5th legs mottled and reticulated with brownish grey, greenish, bluish, or purplish red on a pale cream ground, finger and thumb of chelipeds maroon or purplish, tubercle on inner and outer sides of finger-hinge bright red, dactyls of legs more or less reddish.

Localities.—Durban Bay (Krauss); Inhambane and Mozambique (Hilgendorf); Natal (Stebbing); Delagoa Bay, Inhambane, Beira, Mozambique (coll. K. H. B.).

Distribution.—East coast of Africa, Mauritius, Indo-Pacific to China, Japan, Australia, New Zealand.

This species has migrated through the Suez Canal into the Mediterranean (Fox, 1924, Nature, cxiii, p. 714, and 1927, Trans. Zool. Soc. Lond., xxii, p. 217); and has reached the Gulf of Alexandrette, Syria (Monod, *l. c.*).

Remarks.—Varietal names have been given to several forms according to the distinctness of the tubercles and the shape and sharpness of the anterolateral spines; *cf.* Ward (1942, Mauritius Inst. Bull., ii, p. 79).

Stebbing's small specimen, recorded as *pubescens* (1921), was probably a juvenile of the present spines.

A common edible crab, frequently seen on the markets in Portuguese East Africa.

Lupa sanguinolenta (Herbst)

Blood-spot Spiny Swimming-crab.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 359 (*Neptunus s.*).

1910. Stebbing, *l. c.*, p. 307.

1914. Lenz. and Strunck, D. Südpol Exp., xv, p. 278.

1927. Hale, *l. c.*, p. 150, fig. 151 (*Portunus s.*).

1932. Shen, Hong Kong Natur., iii, p. 34, figs. 2, 3, and pl. 7, fig. *a* (*Portunus s.*).

1935. Chopra, *l. c.*, p. 474, fig. 2 (1st plp. ♂) (*Neptunus s.*).

1938. Boone, Bull. Vanderbilt Mar. Mus., vii, p. 223, pls. 81–83 (*Neptunus s.*).

1945. Stephensen, Dan. Sci. Invest. Iran. pt. 4, p. 123, fig. 26, D (plp. 2 ♂).

[Not Krauss, Südafrik. Crust., p. 11 = *sayi*. See Rathbun, 1930, *l. c.*, p. 37.]

Carapace very broad, about twice as broad as long, granulate, but hinder part more or less smooth and nitidulous in adult, a fine transverse granulate line across gastric region, and another across branchial region from the large lateral spine, front with 4 teeth. Upper orbital margin with 2 fissures. Chelipeds, 4th joint with 3–4 spine-teeth on front margin, but none on hind margin, hand with smooth or very finely granulate costae (the granules more noticeable in juv. than in

adult), and 2 spines, one at base and one distally. A small spine at apex of hind margin of 5th joint of 2nd and 3rd legs.

Length up to 67 mm., breadth 168 mm. (incl. spines). Salmon-pink with 3 red spots near hind margin of carapace, chelipeds more or less reddish and mottled above, finger and thumb on inner surface and the tubercle on inside and outside of finger-hinge maroon, dactyls more or less reddish.

Localities.—Cape St. Blaize and Durban (Stebbing); Mozambique channel (Lenz); Agulhas Bank from Mossel Bay eastwards to Natal and Zululand, 0–30 fathoms (S. Afr. Mus.); Delagoa Bay (coll. K. H. B.).

Distribution.—Réunion, south of Madagascar on Sargassum weed, east coast of Africa, Indo-Pacific to China, Japan, Australia, Hawaiian Is.

Gen. Monomia Gistel

1833. de Haan, Fauna Jap. Crust., pp. 3, 8 (*Amphitrite*, nom. preocc.).

1848. Gistel, Naturgesch. Thierr., p. viii.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 30 (*Amphitrite*, subgen. of *Neptunus*).

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 33 (as syn. of *Portunus*).

1939. Ward, Amer. Mus. Novit., 1049, p. 3.

Carapace tomentose, moderately broad, little convex, the 9th antero-lateral tooth strong. Basal joint of ant. 2 produced in a blunt lobe-like process (fig. 27, *c*). Epistome not strongly spiniform. Apex of 4th joint of mxp. 3 truncate, thickened and produced outwards (fig. 27, *c*). Abdomen ♂ with the composite 3rd (fused 3rd–5th) segment narrowing rapidly distally, the penultimate and ultimate segments narrow with sinuous lateral margins. Distal margin of 4th joint of 5th leg granulate, 6th joint and dactyl with longitudinal ribs and intervening bands of fine pile (fig. 30, *d*). Otherwise as in *Lupa*.

Key to the South African Species.

1. Suborbital notch with a distinct fissure. Beading on postero-lateral margin of carapace composed of one row of granules . . . . . *gladiator.*
2. Suborbital notch with only a trace of a fissure. Beading composed of 2–3 rows of granules . . . . *argentata.*

Monomia gladiator (Fabr.)

1899. Alcock, *l. c.*, p. 35 (*Neptunus* (*Amphitrite*) *g.*).

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 58 (*Callinectes gladiator* Fabr.).

1937. Shen. Bull. Raffles Mus., 13, p. 101, fig. 2, *a–c.*

[Not *Callinectus gladiator* Benedict 1893. West Africa.]

Carapace tomentose, with low granulate elevations, front with 4 teeth, the middle pair smaller, upper orbital margin with 2 fissures, outer angle of the intervening lobe dentiform, last antero-lateral tooth not more than $2\frac{1}{2}$ times larger than any of the others. Epistomal projection moderate. Chelipeds, 4th joint with 4 spine-teeth on inner margin, 2 on outer margin distally, granules on upper surface of 4th joint and lower surface of hand more or less in squamose lines, wrist and hand with granulate ridges, 2 spines on upper surface of hand, one at base, one at apex, ridge forming the outer edge of lower surface of hand very prominent. No spine on outer margin of 5th joint on 2nd and 3rd legs; distal and hind margin of 4th joint of 5th leg granulate. Abdomen ♂ with sinuous margins, 6th segment widest in middle; 2nd and 3rd segments with strong transverse keel in both sexes. 1st pleopods ♂ crossing, the narrow distal portion about as long as the broader basal portion. Sternum very flat, tomentose, the anterior segment (between bases of chelipeds) with numerous irregularly arranged granules. Outer surface of 3rd–6th joints of mxp. 3 and the exopod granulate.

Length up to 37 mm., breadth 67 mm. Brownish orange, chelipeds with crimson spots.

Locality.—Natal (Stebbing, and S. Afr. Mus.).

Distribution.—Mauritius, Indian Seas, East Indies.

Remarks.—The postero-lateral border of carapace, which has its angles rounded, of the single large ♂ in the South African Museum collection has a *single* row of granules. The suborbital notch is continued at its apex into a distinct fissure.

Monomia argentata (White, M. Edwards)

Figs. 27 *c*, 30, *a–d.*

1861. Milne Edwards, Arch. Mus. Paris, x, pp. 332, 339, pl. 31, fig. 4 (*Neptunus a.*).

1899. Alcock, *l. c.*, p. 36 (*Neptunus* (*Amphitrite*) *a.*).

1902. de Man, Abh. Senckenb. Ges., xxv, p. 642 (*Neptunus* (*Amphitrite*) *a.*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*Neptunus a.*).

Very closely allied to *gladiator*, and often regarded merely as a variety. Distinguished as follows: a smaller species, carapace slightly longer in proportion to its breadth, granulate elevations rather more prominent, outer angle of middle lobe of upper orbital

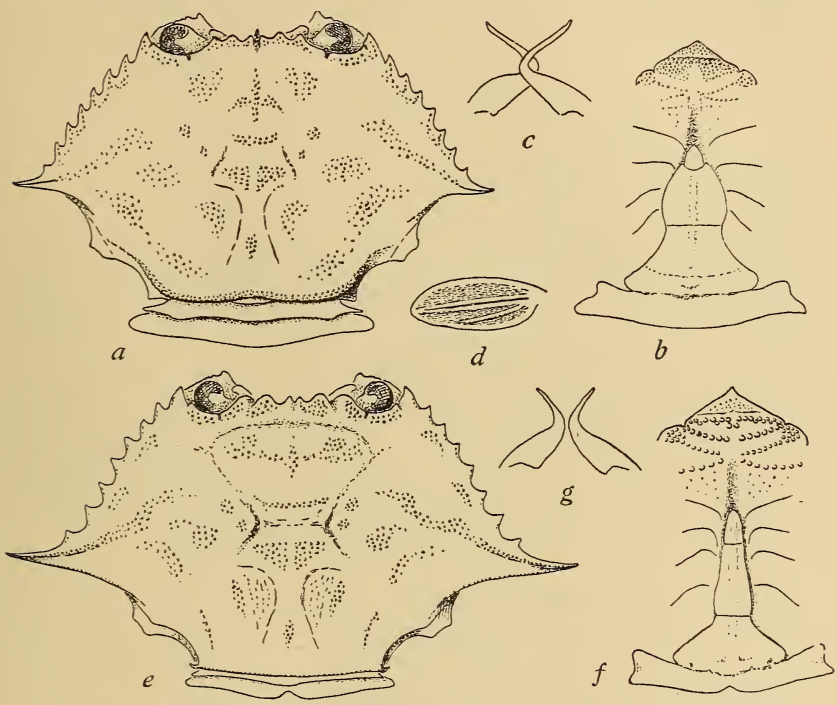


Fig. 30.—*Monomia argentata* (White, M. Edw.). *a*, carapace and 1st–3rd abdominal segments ♂. *b*, sternum between chelipeds and 3rd–7th abdominal segments ♂. *c*, 1st pleopods ♂. *d*, dactyl of 5th leg, marginal setae omitted. *Hellenus hastatoides* (Fabr.). *e*, carapace and 2nd and 3rd abdominal segments (1st segment invisible) ♂. *f*, sternum between chelipeds, and 3rd–7th abdominal segments ♂. *g*, 1st pleopods ♂.

margin blunter, the ridge on outer surface of hand and that on thumb of cheliped not only more salient but with a pearly sheen, the keel on 3rd abdominal segment likewise more salient, and pearly; often (but not always) a dark spot near top of dactyl of 5th leg.

Length up to 18 mm., breadth 31 mm.

Localities.—Delagoa Bay (Barnard); off Umvoti River mouth, Natal, 27 fathoms (S. Afr. Mus.).

Distribution.—The same as that of *gladiator*. ? Hawaiian Is. (Rathbun, 1906).

Remarks.—Both the Delagoa Bay ♂ and the Natal ovigerous ♀ have 2–3 rows of granules along the postero-lateral margin of carapace. The suborbital notch has only the merest trace of a fissure at its apex. Not only the keels mentioned above, but the whole carapace and chelipeds of these specimens when dried and cleaned show the pearly lustre (*cf.* de Man, *l. c.*).

Gen. Hellenus M. Edw.

1879. Milne Edwards, Crust. Mexique, pp. 210, 221.

1887. de Man, J. Linn. Soc. Lond., xxii, p. 70.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, pp. 30, 31.

Carapace tomentose, moderately broad, little convex, 9th antero-lateral tooth strong. Postero-lateral margin with angular or uncinate angles. Abdomen ♂ with ultimate and penultimate segments very narrow, so that the abdomen is T-shaped. Otherwise as in *Monomia.*

Remarks.—de Man says M. Edwards grouped under this subgenus species in which the postero-lateral angles of the carapace were acute and often armed with a short spine. Alcock follows this arrangement. But Rathbun (1930, Bull. U.S. Nat. Mus., no. 152, p. 33) gives *spinicarpus*, a species with *rounded* postero-lateral angles, as the type of the genus *Hellenus* (*cf.* her figure, pl. 45, and description, p. 92).

Hellenus hastatoides (Fabr.)

Fig. 30, *e–g.*

1899. Alcock, *l. c.*, p. 38 (*Neptunus* (*Hellenus*) *h.*).

1935. Chopra, Rec. Ind. Mus., xxxvii, p. 477, fig. 4 (1st plp. ♂) (*Neptunus h.*).

1937. Shen, Bull. Raffles Mus., 13, p. 107, figs. 5 *a–c*, 8, *g*, *h.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Carapace tomentose, flattened, but with low granulate elevations, front with 4 teeth, the middle pair much smaller than the outer pair, which is blunt, upper orbital margin with 2 fissures, the outer corner of the intervening lobe shortly dentiform, postero-lateral margin finely beaded (middle portion with 2–3 rows of granules), postero-lateral angles acute, up-turned or claw-like. Epistomal projection very short. Suborbital notch not wide, narrowing rapidly to a fissure. Chelipeds and legs as in *gladiator*; distal margin of 4th joint of 5th leg denticulate. Abdomen in ♂ with the fused 4th and 5th segments narrowing very rapidly, 6th segment twice as long as its middle width;

in both sexes 2nd segment transversely keeled, but not as strongly as in *gladiator*, 3rd strongly keeled, usually with slight median indent. 1st pleopods ♂ not crossing, the distal portion shorter than the broader basal portion. Sternum very flat, tomentose, the anterior segment (between the chelipeds) in ♀ as in *gladiator*, but in ♂ with few and larger granules (almost tubercles) in transverse rows. Outer surface of mxp. 3 scarcely or only feebly granulate.

Length up to ♂ 19 mm., ♀ 18 mm., breadth ♂ 37 mm., ♀ 36 mm.

Locality.—Coast of Zululand, 25 fathoms (S. Afr. Mus.).

Distribution.—Indian Seas, Persian Gulf, Hong Kong.

Remarks.—The s.s. *Pieter Faure* took 85 specimens of this species in two hauls in the above area, including juveniles 7 mm. in length, and ovigerous ♀♀. The large lateral spine, and the uncinate spine at the postero-lateral angle, are relatively larger in the young than in the adult.

Gen. Achelous de Haan.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 30 (subgen. of *Neptunus*).

1910. Stebbing, *l. c.*, p. 307.

1920. *Id.*, Ann. S. Afr. Mus., xvii, p. 236.

1938. Gordon, Bull. Raffles Mus., no. 14, p. 179.

[Not Rathbun, 1930, *l. c.* pp. 33, 35, subgen. of *Portunus*.]

Carapace glabrous, subcircular or not very broad, flat, postero-lateral angles rounded. Antero-lateral teeth subequal, the 9th either very little larger, or even smaller than, the others. Epistome feebly produced. Apex of 4th joint of mxp. 3 truncate, thickened, produced laterally. Dactyl of 5th leg glabrous.

Remarks.—Rathbun gives *spinimanus* Latr. as the genotype, but her description of that species will not fit into Alcock's definition. Ward (1942, Mauritius Inst. Bull., ii, p. 79) creates a new genus *Cycloachelous* for the Indo-Pacific forms.

Achelous orbicularis Richters

Fig. 31, *a*.

1920. Stebbing, *l. c.*, p. 236.

1942. Ward, Mauritius Inst. Bull., ii, p. 51 (*Cycloachelous o.*).

Carapace glabrous and nitidulous, feebly granulate in places, with patches of distinct granules mostly near the periphery and on the gastric and cardiac regions. Middle pair of frontal teeth smaller than

outer pair; upper orbital margin with only one fissure, antero-lateral teeth subequal, the 1st (outer orbital tooth) longest, the 9th smallest. Suborbital notch rapidly narrowing to a fissure. 4th joint of mxp.3, *cf.* figure 27, *c* of *argentata*, but outer apical angle sharper. Cheliped, 4th joint broad, hind margin strongly convex, with 2 spines, front margin with 4 spines, wrist and hand with smooth ridges except the uppermost one on hand which is granulate. No spine on outer apex of 5th joint of 2nd and 3rd legs; 4th joint of 5th leg longer than wide, hind margin smooth. Abdomen ♀ 2nd segment feebly, 3rd strongly transversely keeled. Abdomen and sternum glabrous and smooth.

Length ♀ 18 mm., breadth 24 mm.

Locality.—Off Umkomas River mouth, Natal, 13 fathoms (Stebbing).

Distribution.—Mauritius, Laccadives, and Andaman Is.

Remarks.—Only the one non-ovigerous ♀ has been discovered in South African waters.* The species is easily recognized by its shape.

Gen. Scylla de Haan

1910. Stebbing, *l. c.*, p. 308.

Carapace glabrous (except around margins), broad, moderately convex and nearly even, front with 4 teeth (excl. inner orbital teeth), antero-lateral margin with 9 (incl. outer orbital tooth) subequal teeth, the last not enlarged or laterally outstanding, postero-lateral angles rounded. Upper orbital margin with 2 fissures. Basal joint of ant. 2 with subacute process, not excluding rest of antenna from orbit. Epistome not produced. Outer surface of mxp. 3 smooth, apex of 4th joint rounded-quadrate. Chelipeds robust, wrist and hand smooth, without ridges (except feeble ones in juvenile), hand inflated. Legs smooth; 4th joint of 5th leg longer than broad, dactyl glabrous, ovate, the hinder half projecting apically in a minute point (unguis) (fig. 31, *c*). Abdomen of ♂ triangular, evenly tapering, 3rd–5th segments coalesced; 2nd and 3rd segments not strongly keeled in either sex.

Scylla serrata (Forskal)

Fig. 31, *b*, *c*.

1838. McLeay, Annulosa S. Afr., p. 61 (*Achelous crassimanus*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 799.
1910. Stebbing, *l. c.*, p. 308, and *ibid.* (*A. crassimanus*).
1917. *Id.*, Ann. Durban Mus., ii, p. 9.

* One juv. ♂, 28° 28′ S., 32° 25′ E., 27 m., Fisheries Survey, 1948.

1932. Shen, Hong Kong Natural., iii, p. 36, figs. 4, 5, and pl. 7, fig. *b*.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 68, pls. 25–30.

1940. Arriola, J. Philipp. Sci., lxxiii, p. 437, pls. 1–3 (habits, etc.).

Carapace finely granulate, with a faint transverse granular line across gastric region, and one across each branchial region from the 9th lateral tooth. Cheliped, 4th joint with 3 spines on front margin, 2 on hind margin, hand with one spine-tooth on upper surface at base, and 2 at apex. No spines on legs.

Length up to 140 mm., breadth 220 mm. Dark brownish or greenish, chelipeds and legs more or less mottled with paler brown or reddish or whitish markings.

Localities.—Plettenberg Bay (Pt. Elizabeth Mus.); Zwartkops River, Algoa Bay (McLeay, Miers); Durban Bay (Krauss, Miers, Stebbing); Mozambique (Miers); Delagoa Bay, Inhambane, Beira, Chinde, Mozambique (coll. K. H. B. 1912).

Distribution.—East coast of Africa, Mauritius, Indo-Pacific to Japan and Australia.

Remarks.—This large and powerful crab inhabits mud-banks in estuaries, bays, and mangrove swamps, where it digs deep burrows. It is edible, and is to be seen in all markets on the east coast.

McLeay's species is obviously the common *serrata*, as there is no other crab in South African waters of the size given by him. Stebbing hesitated to accept the synonymy on account of McLeay's statement that the abdomen (♂) had 7 segments; but the sutures of 7 segments are discernible in specimens, and McLeay did not notice, or did not attach any importance to, the fact that segments 3–5 are not actually articulated or movable *inter se*. Mr. Ward informs me that McLeay's type is not in the McLeay collection in the Australian Museum.

Gen. Gonioneptunus Ortm.

1893/4. Ortmann, Zool. Jahrb. Abt. Syst., vii, p. 79.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, pp. 48, 67 (subgen. of *Charybdis*).

1935. Shen, Ann. Mag. Nat. Hist. (10), xv, p. 404 (subgen. of *Charybdis*).

Carapace tomentose, broad, little convex, regions fairly well defined, front with 4 teeth (excl. inner orbital teeth), antero-lateral margin with 6 teeth (incl. outer orbital tooth), the 2nd one usually smaller than the others, the 6th not very prominent, postero-lateral angles

more or less rounded. Upper orbital margin with 2 fissures. Basal joint of ant. 2 with lobe-like subtruncate process, not meeting front and not excluding rest of antenna from orbit. Epistome not produced.



Fig. 31.—*Achelous orbicularis* Richters. *a*, carapace ♀.
Scylla serrata (Forskal). *b*, carapace. *c*, dactyl of 5th leg, marginal setae omitted.
Gonioneptunus africanus (Shen). *d*, carapace. *e*, ventral view of front. *f*, cheliped. *g*, 4th joint of (left) mxp. 3. *h*, 4th joint of 5th leg. *i*, dactyl of 5th leg, marginal setae omitted.
Gonioneptunus smithii (McLeay). *j*, outline of carapace drawn from photograph of McLeay's type forwarded by Mr. Melbourne Ward.

Apex of 4th joint of mxp. 3 produced in a thin rounded lobe (fig. 31, *g*). Chelipeds moderately elongate, hind margin of 4th joint usually ending in a spine, wrist and hand costate. 4th joint of 5th leg with spine on hind margin, dactyl ovate, with small but distinct unguis,

and pilose stripes (fig. 31, *i*). Abdomen with 3rd–5th segments completely fused in ♂; 2nd and 3rd segments keeled in both sexes, the 3rd more strongly so than 2nd.

Remarks.—Although usually regarded as a subgenus of *Charybdis*, it is clearly distinguished by the non-exclusion of the distal part of antenna 2 from the orbit, if importance be attached to this character. Alcock makes *subornatus* Ortm. a synonym of *truncatus* (Fabr.), but Shen does not refer to the latter species.

Key to the South African Species.

1. Outer orbital tooth not reaching the level of any of the notches between frontal teeth. 6th lateral tooth scarcely projecting beyond (laterally) the 5th tooth (fig. 31, *j*) . . . . . *smithii.*
2. Outer orbital tooth reaching at least to the level of apex of inner orbital tooth. 6th lateral tooth projecting a little, but definitely, beyond the 5th tooth (fig. 31, *d*) . . *africanus.*

Gonioneptunus smithii (McLeay)

Fig. 31, *j*.

1838. McLeay, Annulosa S. Afr., p. 61 (*Charybdis s.*).

1910. Stebbing, *l. c.*, p. 307 (*Charybdis s.*).

Carapace glabrous (McLeay), with very faint fine granular transverse lines, with patches of granules on cardiac and inner branchial regions, 4 acute frontal teeth, with shallow notches between the pair on either side of the deeper median notch, a deeper notch between the outermost frontal and inner orbital teeth, which latter is widely bifid; the upper orbital margin oblique so that the apex of outer orbital tooth lies far behind level of inner orbital tooth or any of the frontal notches; suborbital tooth not projecting beyond level of frontal teeth; 2nd antero-lateral tooth smaller than the others, 6th scarcely projecting beyond the 5th, 1st–5th teeth somewhat squarish, externally granulate-serrate, the outer margin of first 4 teeth *diverging* backwards, that of 5th tooth perpendicular to transverse axis of carapace. Cornea (apparently) not enlarged. Chelipeds, 4th joint granulate, 4–5 (McLeay: 3) spines on front margin, hind margin ending in a spine, wrist and hand with granulate costae, the granules being especially well developed on inner upper margin and on both inner and outer surfaces of hand, hand with one spine at base, one at apex. 4th joint of 5th leg longer than broad, with spine on hind margin, 6th joint with smooth hind margin, dactyl with ungual point.

Length 41 mm., breadth 56 mm. (*fide* M. Ward).

Locality.—South Africa (McLeay).

Remarks.—The present description and figure taken from a photograph of McLeay's type forwarded by Mr. Melbourne Ward. McLeay's species is considered by Mr. Ward to be the same as *truncatus* M. Edw., non Fabr.

Gonioneptunus africanus (Shen)

Fig. 31, *d–i.*

1935. Shen, *l. c.*, p. 405, figs. 1 and 2, *d.*

Carapace tomentose, with transverse lines of granules on gastric and branchial regions, patches of granules on frontal, orbital, and antero-lateral margins, and on cardiac and inner branchial regions; the 4 frontal teeth rounded or subacute, the middle pair slightly more prominent, separated by a deeper notch than that between the inner and outer tooth on each side; inner orbital tooth angular, not so prominent as outer frontal tooth; upper orbital margin semicircular, outer orbital tooth extending forwards to level of inner orbital or outer frontal tooth; suborbital tooth projecting beyond level of frontal teeth; 2nd antero-lateral tooth the smallest, 6th projecting beyond 5th laterally, 1st–5th teeth somewhat squarish, externally granulate-serrate, outer margin of first 3 teeth *diverging* backwards, that of 4th and 5th *converging* backwards. Process of basal joint of ant. 2 subquadrate, subtruncate. Cornea globular, wider than stalk. Chelipeds, 4th joint granulate, with 3 (major) spines on front margin, hind margin ending in a spine (not large and usually adpressed), wrist and hand with granulate costae, granules especially well developed on inner upper margin and on outer surface of hand, inner surface of hand smooth with a low smooth or only feebly granulate ridge, upper surface with one spine at base and 2 at apex. 4th joint of 5th leg longer than broad (nearly twice as long as broad in juv., but only $1\frac{1}{2}$ times in adult), with spine on hind margin, 6th joint with smooth hind margin, dactyl with ungual point, and pilose stripes. 6th abdominal segment ♂ shorter than its basal width, lateral margins gently convex. 1st pleopods ♂ not crossing, distal portion shorter than the stouter basal portion (cf. *H. hastatoides*).

Length up to ♂ 20 mm., ♀ 17 mm., breadth ♂ 30 mm., ♀ 25 mm.

Localities.—Off Gt. Fish Point, and off Tugela River mouth, 30–63 fathoms (Shen); several other localities between these localities, 25–65 fathoms (S. Afr. Mus.).

Remarks.—The s.s. *Pieter Faure* captured about 85 specimens of this species in the above area, including juveniles from 5 × 8 mm. upwards; smallest ovigerous ♀ 10 × 16 mm.

Gen. Charybdis de Haan

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 47 (part: excl. *Gonioneptunus*).

1910. Stebbing, *l. c.*, p. 306.

1935. Chopra, Rec. Ind. Mus., xxxvii, pp. 482 *sqq.* (figs. 1st plp. ♂).

1936. Leene, Zool. Mededeel., xix, p. 117.

1937. *Id.*, *ibid.*, xix, p. 165.

1937. Shen, Bull. Raffles Mus., xiii, p. 116 (key to species).

1938. Leene, Siboga Exp. monogr., xxxix *c.* 3.

1941. Ward, Amer. Mus. Novit., 1104, p. 3.

Carapace more or less regularly hexagonal, the antero-lateral margins diverging backwards, so that the extent of the fronto-orbital margin is much less than maximum width of carapace; front cut into 6 teeth (excl. inner orbital teeth), usually 6 (sometimes 5 or 7) antero-lateral teeth incl. outer orbital tooth, transverse ridges more or less distinct; postero-lateral and hind margins either evenly curved (*Charybdis sensu stricto*) or meeting in a distinct projecting angle (*Goniohellenus*). Upper orbital margin with 2 fissures. Basal joint of ant. 2 broad, with an apical lobe meeting inner orbital tooth and completely excluding rest of antenna from orbit (fig. 27, *d*). Chelipeds massive, hind margin of 4th joint without (*Charybdis*) or with (*Goniohellenus*) a spine. Legs compressed; 4th joint of 5th leg with or without a spine on hind margin, dactyl ovate, with minute ungual point. Abdomen of ♂ with 3rd–5th segments fused, 2nd and 3rd with moderately salient keels.

Remarks.—The frontal teeth are often blunter and more rounded in juveniles than in adults (*cf.* de Man, J. Linn. Soc. Lond., xxii, p. 84, 1887).

Key to the South African Species.

(All the species belong to *Charybdis s.s.*)

A. No (distinct) transverse ridges *behind* level of last antero-lateral tooth.

1. 1st antero-lateral tooth truncate and notched (fig. 32, *a*). Hind margin of 5th joint of 5th leg without spine, of 6th joint smooth (juv. with 2–3 minute denticles) . . . . . *cruciata*.

2. 1st antero-lateral tooth acute (fig. 32, *b*). Hind margin of 6th joint of 5th leg denticulate.
   a. Hind margin of 5th joint of 5th leg with spine . *merguiensis.*
   b. Hind margin of 5th joint of 5th leg without spine. Hand of cheliped with 3 spines on upper surface (fig. 32, *h*) . . . . . *annulata.*

B. A transverse ridge on cardiac region, and one or 2 ridges on hinder half of each branchial region (fig. 32, *c*).
1. Two ridges on hinder branchial region. All the antero-lateral teeth well developed.
   a. Last antero-lateral tooth not enlarged . . *natator.*
   b. Last antero-lateral tooth twice as long as any of the others (fig. 32, *c*). A stout tooth on lobe of basal joint of ant. 2 . . . *variegata.*
2. One ridge on hinder branchial region. 2nd antero-lateral tooth rudimentary (fig. 32, *d*, *e*) . . *orientalis.*

Charybdis cruciata (Herbst)

Fig. 32, *a*.

1910. Stebbing, *l. c.*, p. 306.

1929. McNeill, Rec. Austral. Mus., xvii, p. 149, pl. 37, fig. 5.

1931. Gordon, J. Linn. Soc. Lond., xxxvii, p. 538, fig. 13, *e* (1st plp. ♂).

1932. Shen, Hong Kong Natural., iii, p. 38, fig. 6 and pl. 8.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 53, pl. 17 (*crucifera*).

1935. Chopra, *l. c.*, p. 482, fig. 7 (1st plp. ♂).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 114, fig. 24, A (plp. 2 ♂).

Carapace about $\frac{2}{3}$ as long as broad, glabrous in adult, sparsely setose in juv., nearly smooth; 1st antero-lateral (outer orbital) tooth truncate and feebly notched or bifid, last tooth scarcely more prominent than the others; a fine granular line joining the last antero-lateral teeth but interrupted or obsolete medianly, and 2 lines on gastric region, the anterior one widely interrupted medianly, all lines becoming faint in adult; the curved costate hind and postero-lateral margins prominent in juv., less so (medianly) in adult. Lobe of basal joint of ant. 2 with a granulate ridge. Chelipeds, 4th joint with 3 large spines on anterior margin, hand with 4 spines on upper surface, only 2 costae on upper surface, the lower of which is continued on to thumb, costae granulate in juv., smooth in adult, intervening surfaces somewhat wrinkled. 5th leg, 4th joint $\frac{3}{4}$ as broad as long, with spine on hind

margin, 5th joint without spine, 6th joint with smooth entire hind margin in adult, but with 2–3 minute denticles in juv. Lateral margins of 6th abdominal segment ♂ gently convex and gradually converging distally. 1st pleopods ♂ curving evenly outwards, not crossing.

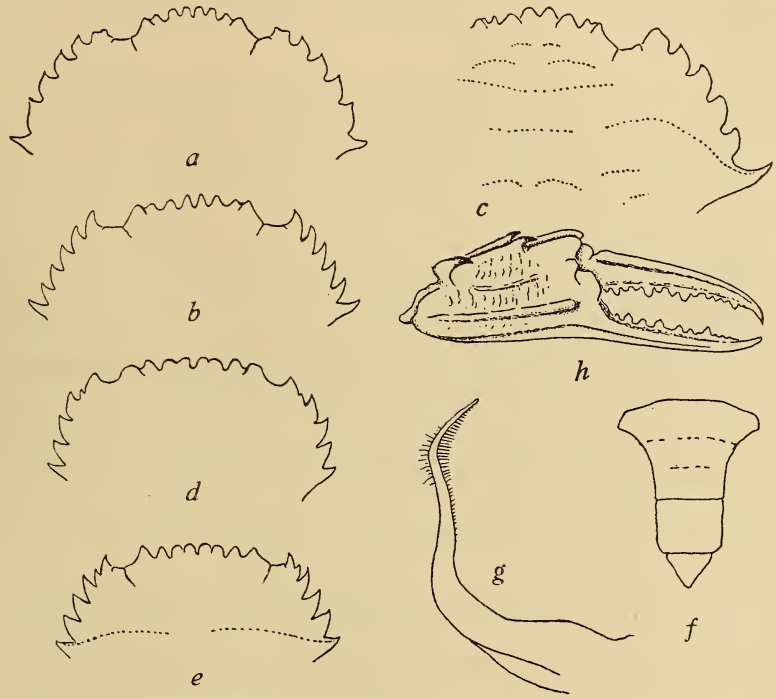


Fig. 32.—*Charybdis cruciata* (Herbst). *a*, outline of anterior part of carapace.
Charybdis merguiensis (de Man). *b*, the same.
Charybdis variegata (Fabr.). *c*, the same (after Shen).
Charybdis orientalis Dana. *d*, the same (after Rathbun). *e*, the same, ♂ from Delagoa Bay. *f*, 3rd–7th abdominal segments ♂. *g*, 1st pleopod ♂.
Charybdis annulata (Fabr.). *h*, chela, outer view slightly from above.

Length up to 80 mm., breadth 122 mm. Buff or cream-coloured, with bands and patches of carmine or maroon, usually a more or less distinct pale cross on gastric region, chelipeds and legs banded or reticulated or spotted with rose-red, finger and thumb mostly pale, tips dark reddish or violet-brown.

Localities.—Port Alfred (Stebbing); Durban and Delagoa Bay (S. Afr. Mus.).

Distribution.—Indo-Pacific to Japan and Australia.

Charybdis merguiensis (de Man)

Figs. 27, *d*, 32, *b*.

1830. Rüppell, Beschreib. 24 Krabben, p. 4, pl. 1, fig. 1, pl. 6, fig. 1 (*Talamita sexdentata* Herbst).

1887. de Man, J. Linn. Soc. Lond., xxii, p. 82, pl. 5, figs. 3, 4 (*Goniosoma m.*).

1899. Alcock, *l. c.*, p. 55.

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 10 (*sexdentata* Herbst).

1910. *Id.*, *l. c.*, p. 306 (*sexdentata* Herbst).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

1930. Monod, Zool. Anz., xcii, p. 140, fig. 7.

1935. Chopra, *l. c.*, p. 484, fig. 8 (1st plp. ♂).

1937. Leene, *l. c.*, p. 165.

1937. Shen, Bull. Raffles Mus., 13, p. 121, fig. 12, *a–d*.

Like *cruciata*, but frontal teeth more acute, antero-lateral teeth all more claw-like or spiniform, the 1st acute; hand of cheliped with 5 spines; 4th joint of 5th leg half as broad as long, hind margin of 5th joint (as well as 4th) with a spine, hind margin of 6th with 6–12 denticles. 6th abdominal segment ♂ with parallel (or slightly divergent) sides until within a quarter of distal margin, where they converge rapidly; 1st pleopods considerably more slender and somewhat sinuous in their distal half; tips of finger and thumb pale in colour.

Length up to 46 mm., breadth 69 mm. Buff or cream or dirty grey, with reddish or crimson patches medianly on hinder half of carapace, and on either side of median line anteriorly, chelipeds and legs mottled and banded, finger and thumb red basally, dark brown distally with white tips.

Localities.—Natal (Stebbing, and S. Afr. Mus.); Delagoa Bay (Barnard).

Distribution.—Indian Seas, East Indies to Hong Kong. Also recorded from Palestine (migrated via Suez Canal).

Remarks.—The coloration is very like that given by Rüppell for Red Sea specimens as regards the finger and thumb of chelipeds. Monod's specimen had 3 blackish-red spots on carapace.

Leene (*l. c.*, p. 168) states that the type of *sexdentata* Herbst 1783 (not *sexdentata* de Haan 1850 = *japonica* M. Edw. 1861) seems to be lost, so that its identity cannot be established. It is therefore preferable to use de Man's name for this species, which is well characterized by the spine on 5th joint of 5th leg.

Charybdis annulata (Fabr.)

Fig. 32, *h*.

1899. Alcock, *l. c.*, p. 54.

1937. Leene, *l. c.*, p. 167, fig. 1.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 393, fig. 4 (♂ abd. and 1st plp.).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Resembling *merguiensis*, but upper margin of hand has only 3 spines, the apical pair being reduced to mere blunt, feebly prominent knobs; 5th joint of 5th leg has no spine on hind margin. 1st pleopods as in *merguiensis*.

Length up to 47 mm., breadth 70 mm. (Alcock). Dull rosy-red, carapace symmetrically mottled (more or less cruciate markings), finger and thumb of chela maroon, legs banded (Stephenson's specimen).

Localities.—Scottburgh, Natal (coll. K. H. B.); Durban (coll. Professor T. A. Stephenson); also one other specimen without locality in South African Museum.

Distribution.—Madagascar, Indian Seas, Malay Archipelago.

Charybdis natator (Herbst)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 801.

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 9, pls. 2, 3 (Crust., pls. 28, 29).

1910. *Id.*, *l. c.*, p. 307.

1932. Shen, Hong Kong Natural., iii, p. 40, figs. 7, 8, and pl. 9, fig. *a*.

Carapace rather coarsely tomentose, a transverse granular ridge between the last antero-lateral teeth (interrupted by the cardiac-branchial grooves) and 2 in front, the anterior one medianly interrupted, one across the cardiac region and 2 short ones on each hinder branchial region; 1st antero-lateral (outer orbital) tooth blunt or truncate, the last smaller than preceding teeth. Lobe of basal joint of ant. 2 with a granulate ridge. Chelipeds granulate-tuberculate on under surface, especially of hand, granules arranged in transverse squamose ridges, front margin of 4th joint with 3 large spines (as well as smaller ones), hand with 5 spines on upper margin. 5th leg, 4th joint with spine on hind margin, 5th joint without spine, hind margin

of 6th joint denticulate (not conspicuously so in large examples). Lateral margins of 6th abdominal segment ♂ convex, slightly diverging until quite near distal margin; 2nd–4th segments in both sexes transversely keeled. 1st pleopods ♂ very slender in apical half.

Length up to 84 mm., breadth 123 mm., cheliped ♂ 230 mm. Mottled reddish or crimson, finger and thumb of chelae maroon-red basally, blackish apically, denticles on finger and thumb mostly blackish.

Localities.—Durban (Krauss, Miers, Stebbing); Inhambane (Hilgendorf); Delagoa Bay (coll. van der Horst).

Distribution.—Indian Seas, East Indies to Philippine Is., and China.

Remarks.—One ♂ specimen in South African Museum has no trace of the transverse squamae on underside of hand of the right cheliped, but is covered quite irregularly with granules of varying sizes.

Charybdis variegata (Fabr.)

Fig. 32, *c.*

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 237.

1935. Chopra, *l. c.*, p. 488, fig. 10 (1st plp. ♂).

1937. Leene, *l. c.*, p. 169, and var. *brevispinosa*, p. 170, figs. 2, 4, *a*, *b*.

1937. Shen, Bull. Raffles Mus., 13, p. 127, fig. 15, *a–c*.

As in *natator*, but last antero-lateral tooth twice as large as preceding one, salient and spiniform as in the species of *Lupa*; and lobe of basal joint of ant. 2 with a prominent tooth. 6th joint of 5th leg with 1–2 inconspicuous spinules distally on hind margin. 6th abdominal segment ♂ broader than long, with strongly convex sides.

Length up to 21 mm., breadth 36 mm.

Locality.—Off Tugela River mouth, 47 fathoms (Stebbing).

Distribution.—Red Sea, Indian Seas, China, Japan.

Remarks.—This small species is distinguished by the prominent tooth on basal joint of 2nd antenna, and the salient last antero-lateral tooth.

Charybdis orientalis Dana

Fig. 32, *d–g.*

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 872, fig. 32 (abd. ♂) and pl. 13, fig. 1.

1918. Stebbing, Ann Durban Mus., ii, p. 50.

Like *natator* and *variegata*, but only one ridge on hinder half of each branchial region, the 2nd antero-lateral tooth is reduced to a denticle at base of 1st tooth, and last antero-lateral tooth is not enlarged (at least in adult; it may be in juv.). Lobe of basal joint of ant. 2 with a smooth (or nearly so) ridge. 6th joint of 5th leg denticulate on hind margin. 6th abdominal segment ♂ with parallel sides (fig. 32, *f*).

Length up to 37 mm., breadth 56 mm.

Localities.—Durban (Stebbing); Delagoa Bay (coll. van der Horst).

Distribution.—Indian Seas, Philippine Is., Society Is., and Hawaiian Is.

Gen. Thalamita Latr.

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 201.

1910. Stebbing, *l. c.*, p. 309.

1938. Gordon, Bull. Raffles Mus., no. 14, p. 176.

1939. Schmitt, Smithson. Misc. Coll., xcviii, 6, p. 16.

Carapace more or less hexagonal, but the antero-lateral margins are subparallel or diverge very little posteriorly owing to the width of the fronto-orbital margin, which is not much less than maximum width of carapace; front cut into 2, 4, or 6 rounded or subquadrate lobes, not including the rather broad inner orbital tooth, 5 (sometimes only 4) antero-lateral teeth including the outer orbital tooth (the penultimate tooth sometimes rudimentary or obsolete), transverse ridges usually distinct, hind and postero-lateral margins evenly curved. Upper orbital margin with 2 fissures. Basal joint of ant. 2 very broad, apical lobe long and in contact for its whole length with inner orbital tooth, thus completely excluding rest of antenna from orbit (fig. 27, *e*). Chelipeds strong. Abdomen of ♂ with 3rd–5th segments fused, 2nd and 3rd feebly or not strongly keeled.

Key to the South African Species.

I. Length of basal joint of ant. 2 (from base to apex of lobe) much greater than major diameter of orbit.

A. Front cut into 6 subequal lobes (excl. inner orbital tooth). No transverse ridges behind level of last antero-lateral tooth (fig. 33, *a*). Hind margin of 6th joint of 5th leg spinulose.

1. 5 subequal antero-lateral teeth (fig. 33, *a*).

a. Transverse ridges faint. Outer surface of hand of cheliped nearly smooth . *crenata*.

b. Transverse ridges very distinct. Outer surface of hand costate . . . *danae*.

2. 4th antero-lateral tooth rudimentary (*cf.* fig. 33, *c*).
   a. Crest on lobe of basal joint of ant. 2 with large spines . . . . . *prymna.*
   b. Crest smooth . . . . . *picta.*

B. Front cut into 2 lobes (fig. 33, *b*, *c*). An additional ridge across cardiac and branchial regions behind level of last antero-lateral tooth (sometimes interrupted or faintly indicated).
   1. Front margin of inner orbital tooth convex, much narrower than either of frontal lobes (fig. 33, *b*). Hind margin of 6th joint of 5th leg smooth . . . . . *sima.*
   2. Front margin of inner orbital tooth straight (or nearly so), not much narrower than frontal lobes. 4th antero-lateral tooth small or rudimentary (fig. 33, *c*). Hind margin of 6th joint of 5th leg spinulose.
      a. Crest on basal joint of ant. 2 serrate . *admete.*
      b. Crest smooth . . . . . *integra.*

II. Length of basal joint of ant. 2 subequal to major diameter of orbit. Front cut into 4 lobes, the middle ones much wider than outer ones (fig. 33, *d*, *g*).

A. 5 antero-lateral teeth, the 4th one small. Transverse ridges distinct (fig. 33, *d*).
   1. 5 spines on upper surface of hand of cheliped. Sternum and abdomen ♂ glabrous but pitted. 1st pleopod ♂ stout (fig. 33, *f*) . *wood-masoni.*
   2. 6 spines on upper surface of hand. Sternum and abdomen ♂ with setose grooves. 1st pleopod ♂ slender distally (fig. 33, *i*) . *delagoae.*

B. 4 antero-lateral teeth, the 3rd one small. Only the branchial transverse ridge distinct (fig. 33, *g*) . *inhacae.*

Thalamita crenata (Latr.), M. Edw.

Figs. 27, *e*, 33, *a*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 800.
1910. Stebbing, *l. c.*, p. 309.
1937. Shen, Bull. Raffles Mus., 13, p. 129, fig. 16, *a–d*.

Carapace more or less tomentose, about $\frac{2}{3}$ as long as broad, with fine granular transverse ridges, 4 short ones in a crescent on anterior border of gastric region, one straight across middle of gastric region, and one joining the last antero-lateral teeth (interrupted medianly and at cardiac-branchial grooves), all 5 antero-lateral teeth subequal; front with 6 subequal rounded-quadrate lobes. Total length of basal

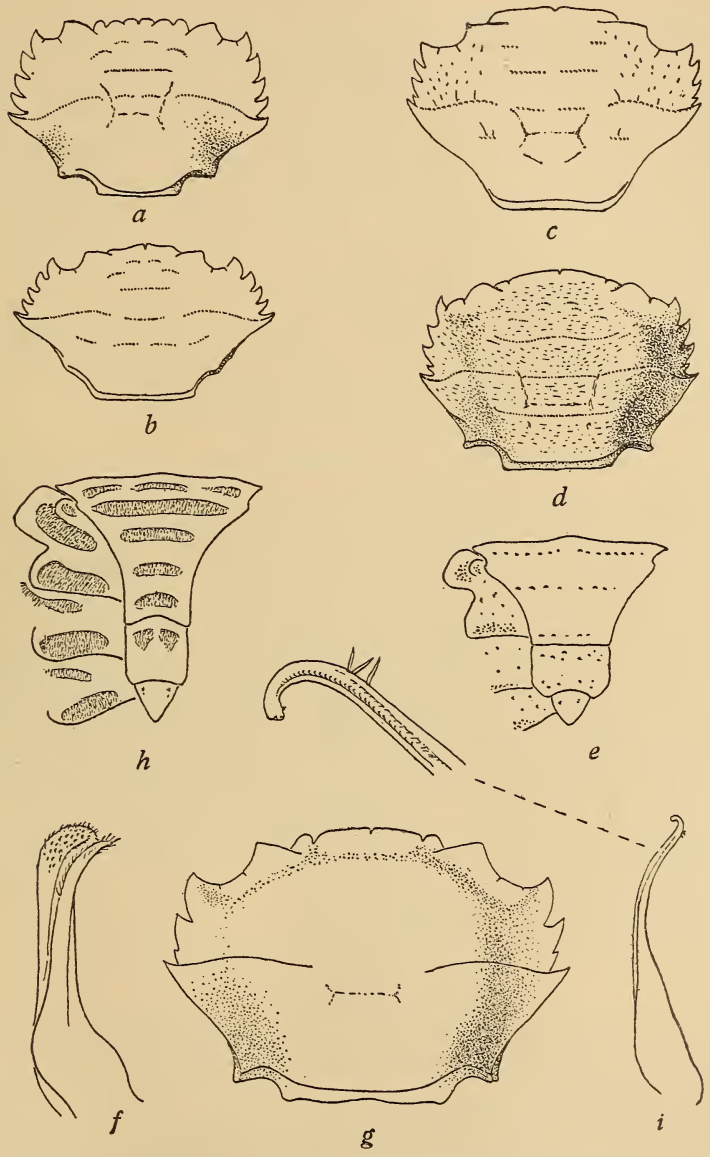


Fig. 33.—*Thalamita crenata* (Latr.), M. Edw. *a*, carapace.
Thalamita sima M. Edw. *b*, carapace (after Shen).
Thalamita admete (Herbst). *c*, carapace.
Thalamita wood-masoni Alc. *d*, carapace. *e*, 3rd–7th abdominal segments ♂. *f*, 1st pleopod ♂.
Thalamita inhacae n. sp. ♀. *g*, carapace.
Thalamita delagoae n.sp. ♂. *h*, 3rd–7th abdominal segments ♂. *i*, 1st pleopod ♂, with apex further enlarged.

joint of ant. 2 much greater than major diameter of orbit, lobe with a granulate crest. Cheliped, front margin of 4th joint with 3 major spines, outer surface of wrist with 3 adpressed teeth, upper surface of hand with 5 spines, the outer apical one, or all of them, blunt, outer surface smooth except for a feebly granulate ridge near lower margin, continued on to thumb. 5th leg, 4th joint with spine on hind margin, hind margin of 6th joint more or less denticulate. 6th abdominal segment ♂ with slightly convex and converging sides. 1st pleopod ♂ slender, especially in its distal third.

Length up to 47 mm., breadth 72 mm.

Localities.—Durban Bay (Krauss, Miers); Mozambique (Bianconi, Hilgendorf, Miers); Delagoa Bay and Mozambique (coll. K. H. B.).

Distribution.—Mauritius, Madagascar, Indo-Pacific.

Thalamita danae Stimpson

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 800.
1887. de Man, J. Linn. Soc. Lond., xxii, p. 78, pl. 4, figs. 8, 9.
1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 77 (references).
1902. Borradaile, *l. c.*, p. 201 (var. of *prymna*).
1934. Shen, Hong Kong Natural., Suppl., no. 3, p. 52, figs. 15, 16.

Differs from *crenata* thus; carapace about ¾ as long as broad, transverse ridges very prominent, upper and outer surfaces of 4th–6th joints of cheliped granulate, 6–7 ridges on hand and the spines much sharper, 6th abdominal segment ♂ much broader than long, its sides divergent for ⅔ their length, then rapidly converging.

Length up to 39 mm., breadth 64 mm. Purplish or brick-red (Stimpson).

Locality.—Mozambique (Hilgendorf).

Distribution.—As for *crenata*.

Thalamita prymna (Herbst)

1887. de Man, J. Linn. Soc. Lond., xxii, p. 75, pl. 4, figs. 5, 6.
1902. Borradaile, *l. c.*, p. 201.
1910. Stebbing, *l. c.*, p. 309.
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.
1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 73, pls. 31–34.
1937. Shen, Bull. Raffles Mus., 13, p. 133, fig. 18 *a–d*.
1942. Ward, Mauritius Inst. Bull., ii, p. 81.

Carapace more or less tomentose, transverse ridges very distinct, the middle gastric ridge continued, following the curve of the orbits,

to the notch between 1st and 2nd antero-lateral teeth, the 4th antero-lateral tooth rudimentary or absent, the 4 middle frontal lobes quadrate, front margin of inner orbital tooth convex. Lobe of basal joint of ant. 2 with a row of spines of which some (1–3) are large. Chelipeds similar to those of *danae*, but without faint ridge separating inner and lower surfaces of hand. 6th joint of 5th leg denticulate. 6th abdominal segment ♂ about as long as broad, with gently convergent sides.

Breadth up to 62 mm. (Hilgendorf).

Localities.—Durban Bay (Krauss); Delagoa Bay (Barnard).

Distribution.—Indo-Pacific.

Thalamita picta Stimpson

? 1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 800 (juv. *crenata* or *picta*).

1884. Miers, Crust. H.M.S. *Alert*, p. 540.

1887. de Man, *l. c.*, p. 76.

1899. Alcock, *l. c.*, p. 79.

1902. Borradaile, *l. c.*, p. 201 (var. of *prymna*).

1937. Shen, Bull. Raffles Mus., 13, p. 135, fig. 19, *a–d*.

1942. Ward, Mauritius Inst. Bull., ii, p. 81.

Differs from *prymna* thus: the 2 middle frontal lobes project more than the others, the ridge on lobe of basal joint of ant. 2 is tooth-like with a smooth entire edge.

Locality.—Mozambique (Hilgendorf).

Distribution.—Red Sea, Amirante Is., Andaman Is., Japan, New Caledonia.

Thalamita sima M. Edw.

Fig. 33, *b*.

? 1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 800 (juv.).

1884. Miers, Crust., H.M.S. *Alert*, pp. 231, 539.

1887. de Man, *l. c.*, p. 75.

1899. Alcock, *l. c.*, p. 81.

1902. Borradaile, *l. c.*, p. 201.

1927. Hale, S. Austral. Crust., pt. 1, p. 151.

1934. Shen, Hong Kong Natural., Suppl., no 3, p. 54, figs. 17, 18.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 126, fig. 27, A–G.

Carapace pilose, with a transverse ridge across the cardiac and branchial regions additional to those found in the preceding species, front with 2 broad lobes, each wider than the inner orbital tooth, the front margin of which is convex; 5 antero-lateral teeth, the 4th somewhat smaller, and the 5th distinctly larger than the others. Lobe of basal joint of ant. 2 with a low smooth crest. Chelipeds granulate, lower surface especially covered with transverse squamae, hand also with squamae on all surfaces, 6–7-costate, with 5 spines, one of which may be blunt. Hind margin of 6th joint of 5th leg smooth.

Length 32 mm., breadth 54 mm.

Localities.—? Inhambane (Hilgendorf); Mozambique (Miers).

Distribution.—Indo-Pacific to Australia and New Zealand.

Remarks.—According to Shen (*l. c.*, fig. 18, *b*) the abdomen of ♂ has transverse pilose bands.

Thalamita admete (Herbst)

Fig. 33, *c*.

1902. Borradaile, *l. c.*, p. 202 (*admeta*).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 874.

1910. Stebbing, *l. c.*, p. 309.

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 440.

1942. Ward, Mauritius Inst. Bull., ii, p. 80.

Carapace pilose, about $\frac{3}{5}$ (or less) as long as broad, with the additional transverse ridge as in *sima*, frontal lobes not much wider than the inner orbital teeth, the anterior margin of which is straight (or nearly so), 4th antero-lateral tooth much smaller than the others and often rudimentary. Lobe of basal joint of ant. 2 with serrated crest (? smooth in juv.). Chelipeds unequal in adult ♂, hand with 5 ridges on upper and outer surfaces, the 3 costae on outer surface granulate, 6 spines above (the 2 distal ones often small), other surfaces smooth or faintly costate or granulate. Hind margin of 6th joint of 5th leg denticulate. 6th abdominal segment ♂ not much broader than long, sides slightly but gradually convergent.

Length up to 15 mm., breadth 24 mm. Reddish orange, more or less mottled, finger and thumb of chela partly brown, tips whitish.

Localities.—Durban Bay (Krauss); Umtwalumi, Natal (coll. Stephenson); Delagoa Bay (coll. van der Horst).

Distribution.—Mauritius, east coast of Africa, Indo-Pacific.

Thalamita integra Dana

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 799.

1884. Miers, Crust., H.M.S. *Alert*, p. 540.

1899. Alcock, *l. c.*, p. 85.

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 441.

Differs from *admete* as follows; carapace not quite so broad, distinctly convex, glabrous, transverse ridges indistinct, especially the hindmost one, crest of basal joint of ant 2 *smooth* and *entire*, chelipeds more smooth and polished, less strongly spinose, 6th abdominal segment ♂ much broader than long.

Localities.—Mozambique (Hilgendorf); Delagoa Bay (coll. van der Horst).

Distribution.—Indo-Pacific.

Remarks.—The West African form, *africana* Miers, was originally described as a variety of *integra*. For its distinguishing features see Rathbun, 1921, Bull. Amer. Mus. Nat. Hist., xliii, p. 402.

Thalamita wood-masoni Alc.

Fig. 33, *d–f*.

1899. Alcock, *l. c.*, p. 90, and var. *taprobanica*, p. 91.

1900. *Id.*, Illustr. Zool. "Investigator," pl. 48, figs 1, 1, *a*, and var. *taprobanica*, figs. 2, 2, *a*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 363.

Carapace rather sparsely setose, the setae arising from numerous tiny transverse squamae which cover the whole upper surface (not mentioned or figured by Alcock), transverse ridges well defined, the cardiac-branchial one medianly interrupted in the typical form but continuous in the variety (according to the figures); front arched, cut into 4 teeth separated by clefts (not notches), the middle ones twice as wide as outer ones, inner orbital tooth convex, antero-lateral teeth moderately acute, the 4th very small and more or less concealed by the lateral setae. Length of basal joint of ant. 2 equal to major diameter of orbit, with a finely granulate low crest. Chelipeds slightly unequal (♂), sparsely pilose, front margin of 4th joint with 3 spines (the proximal one rather small), upper and outer surfaces squamose-granulate, wrist granulate and costate, with 3 spines on outer surface, hand granulate on upper surface and on upper parts of inner and outer surfaces, 5 spines and 2 granulate costae on upper surface, one granulate costa in middle of inner surface, and 2 on lower outer surface,

both the latter continued on to thumb, finger subequal to upper edge of hand in smaller chela, shorter in the larger chela. 5th leg, 4th joint at least twice as long as broad, with spine on hind margin, 6th joint spinulose on hind margin, dactyl ovate-lanceolate, rather rapidly narrowed towards the sharp ungual point. Sternum and abdomen glabrous, but pitted. 6th abdominal segment ♂ nearly twice as broad as long, sides parallel for $\frac{2}{3}$ its length, then rapidly converging (fig. 33, *e*), 1st pleopod ♂ stout (fig. 33, *f*).

Length up to 12·5 mm., breadth 18 mm. Ovig. ♀ 8 × 11 mm.

Locality.—Delagoa Bay (coll. K. H. B.).

Distribution.—Andaman Is. and Palk Strait; the variety from Ceylon.

Remarks.—A single ♂ and an ovigerous ♀ appear to belong to this species, although no mention was made by Alcock of the surface sculpture. The distinctly granulate chelipeds are like those of the typical form (the variety has much smoother chelipeds), but the cardiac-branchial ridge is continuous as figured for the variety.

Thalamita delagoae n. sp.

Fig. 33, *h*, *i*.

♂. Carapace setose, transverse ridges well defined, but both the cardiac-branchial and the additional one behind it interrupted by the cardiac-branchial grooves; front with 4 lobes, the outer ones much smaller than the inner ones (smaller than in fig. 33, *g*); antero-lateral teeth sharp, spiniform, the 4th one very small. Length of basal joint of ant. 2 slightly greater than orbit, with granulate crest. Cheliped (left one only), front margin of 4th joint with 3 spines and some denticles proximally, its upper outer surface finely granulate, wrist granulate and setose, with 4 spines on upper and outer surfaces, hand granulate and setose on upper, and upper outer surfaces only, 6 spines on upper surface, 3 on inner edge, 3 (incl. the basal one) on outer edge, 3 granulate costae on outer surface, the lower 2 continued on to thumb, finger subequal to upper edge of hand, grooved. 5th leg, 4th joint twice as long as broad, with spine on hind margin, 6th joint spinulose on hind margin, dactyl ovate-lanceolate. Sternum and abdomen with transverse setose foveolae or grooves (fig. 33, *h*). 6th segment of abdomen ♂ as broad as long, narrowing slightly distally. 1st pleopod ♂ very slender in distal half, with curved apex (fig. 33, *i*).

Length 9 mm., breadth 15 mm.

Locality.—Delagoa Bay (coll. van der Horst, 1939. 1 ♂).

Remarks.—Judging from tracings and notes kindly supplied by Dr. Gordon (Brit. Mus.), this specimen has a different front from *invicta* Thallwitz, 1890/91; there is some similarity with de Man's "invicta," =*demani* Nobili, but the latter has only 4 antero-lateral teeth (not 5, the 4th being minute). *T. cooperi* Borrad. 1902 also has only 4 antero-lateral teeth, and a differently shaped 1st pleopod ♂.

Thalamita inhacae n. sp.

Fig. 33, *g*.

♀. Carapace nearly glabrous, a few scattered setae, all transverse ridges obsolete except the one on each branchial region running to the last antero-lateral tooth; front cut into 4 lobes separated by small notches, the quadrate middle ones twice as broad as the rounded outer ones, front margin of inner orbital tooth nearly straight; only 4 antero-lateral teeth (incl. outer orbital tooth), acute, the 3rd small. Length of basal joint of ant 2 equal to major diameter of orbit, lobe with a smooth crest. Chelipeds glabrous, all joints smooth and shagreened only, front margin of 4th joint with 3 spines (and some denticles proximally), wrist with 3 adpressed spines (mere ridges without free apices) on outer surface, hand with 5 blunt spines on upper surface, a single smooth ridge on lower part of outer surface continued on to thumb, finger grooved. 5th leg, 4th joint slightly more than twice as long as broad, with spine on hind margin, hind margin of 6th joint spinulose, dactyl ovate, with small ungual point. Sternum and abdomen smooth but pitted.

Length 14 mm., breadth 21 mm. As preserved, pinkish with minute red dots on carapace, legs pale with greyish transverse bands.

Locality.—Inhaca (Inyak) Island, Delagoa Bay (coll. van der Horst, 1937. 1 ♀).

Remarks.—This ♀ specimen resembles *hanseni* Alck. 1899, and *pilumnoides* Borrad., 1902 (*l. c.*, p. 207, fig. 38), in having only 4 antero-lateral teeth, of which the 3rd is small. Alcock's figures (1900, pl. 47) of *investigatoris* and *imparimanus* show bands across the legs. But all these species differ in the shape and number of the frontal lobes.

Family POTAMONIDAE.

Freshwater Crabs.

1897. Ortmann, Zool. Jahrb. Abt. Syst., x, p. 297.

1902. *Id.*, Proc. Amer. Philos. Soc., xli, pp. 267–400, esp. pp. 296–306 (geograph. distribution).

1910. Stebbing, *l. c.*, p. 293.

1910. Alcock, Rec. Ind. Mus., v, p. 253.

1917. Bouvier, C.R. Ac. Sci., clxv, pp. 620, 753.

1921. Rathbun, Bull. Amer. Mus. Nat. Hist., xliii, p. 404.

1929. Balss, Zool. Jahrb. Abt. Syst., lviii, pp. 339 *sqq.* (East Africa and Madagascar).

1936. *Id.*, Rev. Zool. Bot. Afr., xxviii, pp. 200–202 (relationship to S. American forms).

Carapace broader than long, or subcircular, antero-lateral margins convex and not longer (often much shorter) than the convergent postero-lateral margins, regions usually not well defined, branchial regions inflated, front broad. Chelipeds in ♂ unequal, often very much so, in ♀ subequal. Abdomen with 7 segments in both sexes. Male genital openings coxal.

Remarks.—Freshwater crabs distributed over the Old and New Worlds and Australia, tropical and subtropical. For classic discussion of their distribution see Ortmann (*l. c.*, 1902). His conclusions, however, have been criticized (Balss, 1936).

Only one genus or subgenus occurs in South Africa. The genus *Trichodactylus* (Stebbing, 1910, *l. c.*, p. 295) is South American.

A key to the subfamilies, and to the genera of *Potamoninae*, will be found in Alcock (*l. c.*, 1910).

Subfam. Potamoninae.

See Alcock and Rathbun, *l. c.*, *supra.*

Front exceeding $\frac{1}{6}$ width of carapace. Mandibular palp 2- or 3-jointed, the terminal joint consisting of a single lobe, sometimes thickened and setose at base, but never distinctly bilobed. Mxp. 3 with 4th joint broader than long. 1st antennae transverse. Efferent branchial channels not produced to edge of front. Dactyls of walking legs spinose. Old World forms.

Gen. Potamon Savigny

See Alcock and Rathbun, *l. c.*, *supra.*

Subgen. *Potamonautes* McLeay

1910. Stebbing, *l. c.*, p. 293.

1918. Calman, Ann. Mag. Nat. Hist. (9), i, p. 234.

1921. Rathbun, *l. c.*, pp. 405, 406.

1929. Gordon, Ann. Mag. Nat. Hist. (10), iii, p. 405.

1935. Barnard, Ann. Transv. Mus., xvi, p. 482.

1936. Balss, Rev. Zool. Bot. Afr., xxviii, pp. 165 *sqq.* (Congo species).

1942. Chace, Bull. Mus. Comp. Zool. Harv., xci, pp. 186 and 203 (list of African species).

This subgenus is wholly African. Post-frontal crest distinct and continuous, or nearly so, across the epigastric region to the epigastric angle or tooth, sometimes not actually reaching the latter. Front entire. Antero-lateral margins with an epigastric tooth, or at least an obtuse angle, usually granulate or denticulate, but sometimes strongly dentate or spinose. Sometimes (but not in South African species) a tooth between the epibranchial tooth and the outer orbital tooth.

Remarks.—As Miss Rathbun points out (1921, *l. c.*, p. 405), it is almost impossible to frame any strict definitions of the subgenera. And the same applies to the species. The more typical forms of certain species may be defined up to a point; or, in other words, a form from a more or less circumscribed locality or area may be found to exhibit more or less constant features; *e.g.* the typical *perlatus* from the S.W. Cape, typical *sidneyi* from Natal, typical *warreni* from the Orange River system.*

Single specimens often cause difficulty in identification, and when examples from intermediate localities are examined, transitional forms are found. In fact, the more abundant the material and the more numerous the localities, the greater the difficulties (*cf.* Barnard, 1935, *l. c.*, p. 482).

An intensive collecting and examination of material, the tracing of morphological changes in the crab communities, either within a river system or between neighbouring systems, would provide a most interesting biological study, albeit one of considerable magnitude. An examination of the 1st pleopods of ♂ is essential (*cf.* Balss, 1936, and Chace).

The following key is submitted in the hope that it may help in the identification of Museum specimens.

* *Cf.* Pesta, 1946, Ark. Zool., xxxvii, 2, B, pp. 1–6. *Potamon potamios* is to be regarded as a highly variable species exhibiting within its extensive area of distribution a tendency to the formation of aberrant individuals, which are, however, not strictly isolated geographically, nor amenable to a hard and fast taxonomic diagnosis.

Key to the South African Species.

I. Post-frontal crest continuous, sharply raised (fig. 34, *a*). 4th joint of larger cheliped with only the *antero*-inferior granulate margin ending in a tooth or spine.

A. A more or less distinct groove on 3rd joint of mxp. 3.

1. 4th joint of 5th leg (adult) 2–2½ (less than 3) times as long as broad.

a. Epibranchial corner obtusely angular, without projecting tooth or denticle (fig. 34, *a*, *b*).

i. Carapace not strongly inflated.

α. Epibranchial and frontal regions smooth (fig. 34, *a*).

* No strong keel on terminal portion of 1st pleopod ♂ (fig. 35, *c*) . . *perlatus*.

** A strong keel on terminal portion of 1st pleopod ♂ (fig. 35, *e*) . . sp. *Beira*.

β. Epibranchial region granulate-corrugate, frontal region granulate (fig. 34, *b*) . *sidneyi*.

ii. Carapace strongly inflated, epibranchial corners bent downwards . . . . . *inflatus*.

b. Epibranchial corner with a distinct, but sometimes small, tooth (fig. 34, *c*, *d*, *e*).

i. Antero-lateral margin more or less dentate or spinose, post-frontal crest running straight into epibranchial tooth without sinus (fig. 34, *c*) . . . . *warreni*.

ii. Antero-lateral margin merely granulate or denticulate, post-frontal crest with a distinct sinus just internal to the epibranchial tooth (fig. 34, *d*, *e*).

a. Carapace not strongly inflated. Epibranchial tooth strong (fig. 34, *d*).

* Lateral margin projecting for a distance less than width of orbit.

† Antero-lateral margin strongly denticulate . *dubius*.

†† Antero-lateral margin finely granulate . . *dubius jallae*.

** Lateral margin projecting for a distance equal to width of orbit .	*bayonianus.*
β. Carapace inflated. Epibranchial tooth small (fig. 34, *e*) .	*obesus.*
2. 4th joint of 5th leg 3–3⅓ times as long as broad	*depressus.*
B. No groove on 3rd joint of mxp. 3 . . .	*bottegoi.**
II. Post-frontal crest not sharply raised or projecting forwards (fig. 34, *h*), more or less discontinuous. No groove on 3rd joint of mxp. 3. 4th joint of larger cheliped with *both* antero- and postero-inferior granulate margins each ending in a tooth or spine	*calcaratus.*

Potamon (*Potamonautes*) *perlatus* (M. Edw.)

Cape River Crab.

Figs. 34, *a*, 35, *a–c*.

1838. McLeay, Annulosa S. Afr., p. 64.
1843. Krauss, Südafrik. Crust., p. 37, vars. *b* and *c*.
1897. Weber and de Meijere, Zool. Jahrb. Abt. Syst., x, p. 156.
1910. Stebbing, *l. c.*, p. 293.
1912. Lenz, Ark. Zool., vii, no. 29, p. 8 (compared with *sidneyi*).
1921. Rathbun, *l. c.*, p. 417 (compared with Congo species).
1922. Balss, Beitr. Kenntn. Land. Süssw. S.W.A., ii, p. 71.
1924. Colosi, Ark. Zool., xvi, no. 1, p. 2, fig. 1 (sternum, 1st plp. ♂).
1929. Barnard, J. South West Afr. Sci. Soc., iii, p. 62.
1935. *Id.*, *l. c.*, p. 482, fig. 1, *a–b*, and chart.
1936. Balss, *l. c.*, p. 184, fig. 21 (apex. 1st plp. ♂) and chart, fig. 20.

[Not 1920. Colosi, Boll. Mus. Zool. Torino, xxxv, no. 734, p. 33. = *odhneri* Colosi 1924, Equatorial Africa.]

[Probably not: 1889. Pfeffer, Jahrb. Wiss. Anst. Hamburg, vi, p. 33.
1912. Lenz, D. Zentralafr. Exp., iii, zool. i, p. 124.
Both records from Tanganyika.]

Carapace flattish, branchial regions gently convex, epibranchial corner not strongly curving downwards; post-frontal crest well developed, more or less sharp and overhanging, continuous to the obtuse epibranchial angle, almost straight and very little inclined backwards from median line (in adult), sometimes slightly concave between middle line and epibranchial angle. Frontal and orbital margin, post-frontal crest, and antero-lateral margin more or less

* Balss (1929, *l. c.*, p. 348) regards this as a synonym of *obesus*.

beaded-granulate, feebly so in old examples, in which also the hinder continuation of the antero-lateral margin on to the dorsal surface becomes obsolete. Dorsal surface typically quite smooth (microscopically granulate), sometimes with scattered, short and stiff

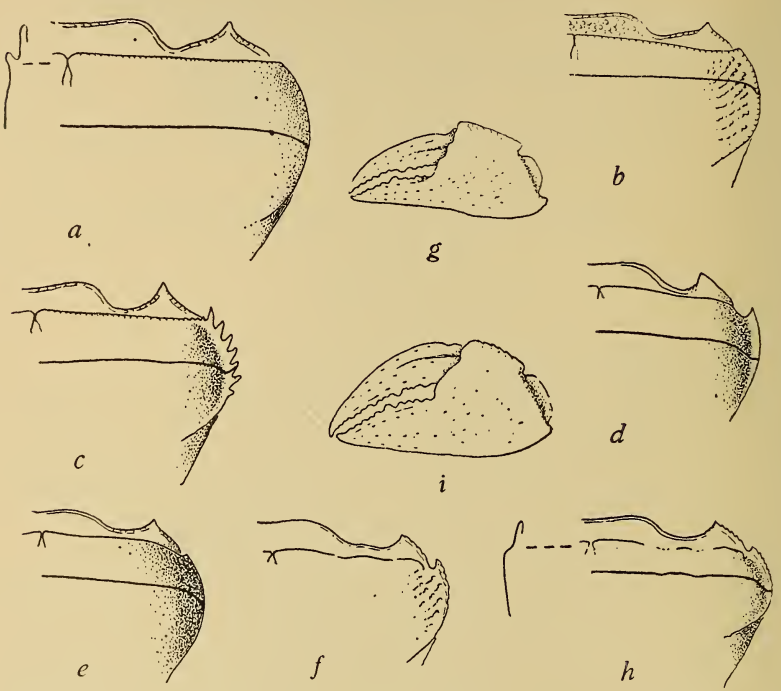


Fig. 34.—*Potamon* (*Potamonautes*) *perlatus* (M. Edw.). *a*, carapace, with profile of front and post-frontal crest in longitudinal section.
P. sidneyi Rathb. *b*, carapace.
P. warreni Calman. *c*, carapace.
P. dubius jallae Nob. *d*, carapace.
P. obesus (M. Edw.). *e*, carapace.
P. bottegoi de Man. *f*, carapace, and *g*, chela (both after de Man).
P. calcaratus Gordon. *h*, carapace, with profile of front and post-frontal crest in longitudinal section. *i*, chela.

(The heavy line in *a*, *b*, *c*, *d*, *e*, and *h* represents the profile of the carapace in *transverse* section.)

bristles in the middle on the carapace, pterygostomial region coarsely but feebly granulate. Outer surfaces of 4th and 5th joints of chelipeds coarsely and feebly squamulose-granulate; lower surface of 4th joint with 2 rows of granules, but only the inner (anterior) row ends in a larger tubercle or tooth; inner margin of wrist with 2 teeth, the

proximal one often small, blunt, or obsolete; finger of the larger chela ♂ sometimes strongly curved (*cf.* Krauss' figure of *depressus*). Middle of the apical margin on inner (anterior) surface of 5th joint of 2nd and 3rd legs with a denticle, sometimes indicated also on the 4th and even the 5th leg. 4th joint of 5th leg 2–2½ times as long as broad (adult). A shallow longitudinal groove on 3rd joint of mxp. 3. Sternum between bases of 3rd maxillipeds ending in a blunt or sharp point (contrary to Colosi's statement and figure, 1924); 2 transverse grooves, the hinder one shallower and often indistinct medianly. Apical piece of 1st pleopod ♂ with a low ridge on the external (ventral) side (fig. 35, *c*).

Length up to 70 mm., breadth 100 mm. Light or dark brown, often with reddish or greenish tinge, chelipeds often violaceous, especially in large specimens.

Localities.—See Stebbing, 1910, and Barnard, 1935. In general the species occurs on the Cape Peninsula and Cape Flats, and northwards to Clanwilliam and Calvinia, and eastwards along the coastal belt to Natal, with extensions inland; and there are isolated records from the Orange Free State, Transvaal, Bechuanaland, and South West Africa. The gaps (see chart) will probably be filled in by later collecting. The (apparent) absence of Crabs from Ovamboland may be due to Bull-frogs (see Barnard, 1929, Journ. S.W.A. Sci. Soc., iii, p. 62. Windhoek, S.W.A.).

Records from Equatorial Africa, Zanzibar, Tanganyika, Angola are open to doubt (specimens recorded by Colosi in 1920 as *perlatus* were later described by him as *odhneri* 1924; and see Balss, 1929, *l. c.*, pp. 347, 348, for other erroneous identifications; also Balss, 1936, for remarks on the *perlatus-johnstoni* group).

While I accept without reserve Balss' (1936) identification of Upper Congo specimens as *perlatus*, on morphological grounds, I am hesitant about accepting the implication that the Cape and Congo communities are *phylogenetically* conspecific.

The typical form is characteristic of the south west Cape, where it shows only very slight variation, and where no other forms occur. Towards Natal and the North and North-east, however, transitional forms occur linking up with *sidneyi* and *warreni*, and making sharp definitions of the species utterly impossible (*cf.* Barnard, 1935).

Distribution.—Upper Congo (Balss, 1936).

Remarks.—In small mountain streams breeding females only 25 mm. in width may be found. A ♀, 50 mm. wide, from the Cape Flats had about 300 embryos nearly ready to hatch (December); a

Natal specimen (species?), 50 mm. wide, was stated to have been carrying 486 juveniles (A. C. Harrison, Inland Fisheries Adviser), and a ♀ 67 mm. wide (Pinetown, Natal, transition *perlatus–sidneyi*) had 435 juveniles.

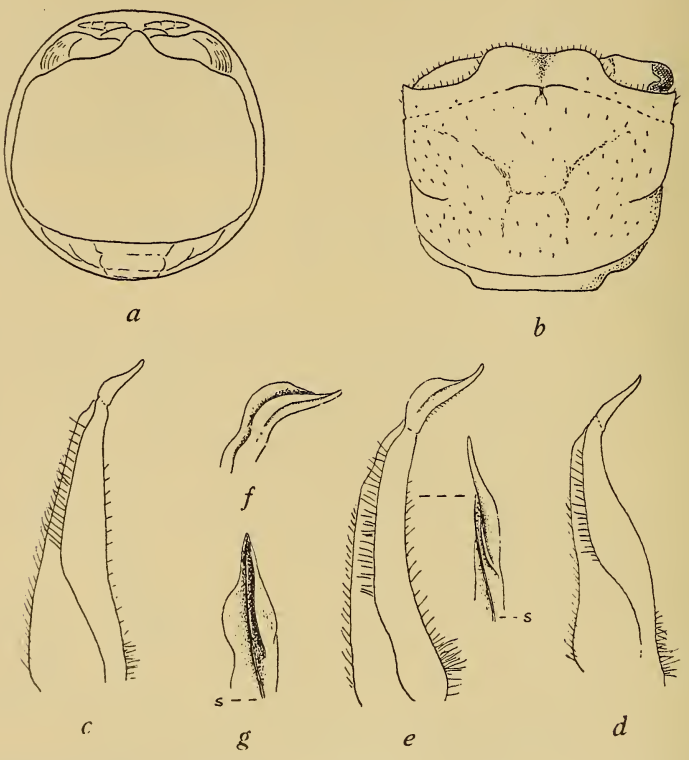


FIG. 35.—*Potamon* (*Potamonautes*) *perlatus* (M. Edw.). *a*, embryo within egg-membrane, 3 mm. diameter. *b*, juvenile from beneath abdomen of mother, 3 × 3·3 mm. *c*, 1st pleopod ♂.
P. calcaratus Gordon. *d*, 1st pleopod ♂.
P. sp. from Beira. *e*, 1st pleopod ♂ ventral view, with apex in median view. (*Cf.* Balss, 1936, fig. 17, *johnstoni*.)
P. sp. from Tanganyika. *f*, *g*, 1st pleopod ♂ apex in ventral and median views. (*Cf.* Balss, 1936, fig. 18, *orbitospinus*.)
(*s* = groove of seminal canal.)

The embryos of the Cape Flats specimen, still folded up within the egg-membrane, measure 3 mm. across the carapace. The carapace of the Pinetown juveniles is 3 mm. in length and 3·3 mm. in breadth. In the embryo the front is narrow and rostriform (fig. 35, *a*). In the juvenile (fig. 35, *b*) the front is about $\frac{2}{5}$ width of carapace, which is

greatest between the outer orbital angles; epibranchial tooth indicated by a minute notch; post-frontal crest developed only near the middle line, but indicated laterally; margins and dorsal surface with scattered setules. The 4th joint of 5th leg is 4 times as long as broad.

The smallest *free-living* juvenile I have seen measures 3·5 × 4 mm. (Potteberg, Bredasdorp Distr., May 1936, A. C. Harrison). The front is about $\frac{4}{9}$ the width of carapace, and still retains a rather conspicuous median groove; post-frontal crest distinct, nearly straight, and sloping backwards from the middle line to a minute epibranchial denticle; carapace widest anteriorly between outer orbital angles and the epibranchial denticles, the antero-lateral margins being straight. The 4th joint of 5th leg is $3\frac{1}{2}$ times as long as broad.

At a later stage, 5 × 6·5 mm., the carapace has assumed the adult shape, *i.e.* it is widest *behind* the level of the epibranchial angles, and the antero-lateral margins are convex, The 4th joint of 5th leg is 3 times as long as broad. The frontal, orbital, and antero-lateral margins are finely beaded.

The largest specimens actually seen by me are from East London.

Potamon (*Potamonautes*) *sidneyi* Rathbun

Natal River Crab.

Fig. 34, *b*.

1843. Krauss, Südafrik. Crust., p. 37 (*perlata* var. *a*).
1910. Stebbing, *l. c.*, p. 295.
1912. Lenz, *l. c.*, p. 7.
1922. Balss, *l. c.*, p. 71.
1935. Barnard, *l. c.*, p. 483, fig. 1, *c*, and chart (as form of *perlatus*).

The typical form is easily distinguished from typical *perlatus* by the stronger granulation of the frontal, orbital, and antero-lateral margins and post-frontal crest, the strongly granular frontal area, the granulate-corrugate epibranchial regions and outer surfaces of 4th and 5th joints of chelipeds. The pterygostomial regions and the margins of the walking legs are also more strongly granulate, the latter (especially the upper margins of the 4th joints) being sometimes distinctly spinulose.

There is, however, a complete transition between the *perlatus* and *sidneyi* forms (*cf.* Barnard, 1935). Whereas the typical smooth *perlatus* occurs as far eastwards as Natal, the typical rough *sidneyi*

has not yet been noted farther west than Kaffirkuils River, Still Bay: *sidneyi* is the form characteristic of Natal, and *perlatus* the form characteristic of the S.W. Cape.



Approximate distribution, as far as at present known, of some of the distinctive species of Freshwater Crabs, *Potamon* (*Potamonautes*), in South Africa.

P. perlatus ≡, passing eastwards into the *sidneyi* form.

P. warreni ||||, where the vertical and horizontal lines cross transitional forms are found.

P. dubius ○. *P. dubius jallae* ⊙. *P. bayonianus* ■. *P. obesus-bottegoi* □. *P. calcaratus* △.

Length up to 40 mm., breadth 55 mm.

Localities.—See Barnard, 1935. Specimens from the northern part of the Cape Province (Calvinia, Victoria West, Griquatown, Postmasburg) tend towards the rough *sidneyi* form; I have seen specimens with slight indications of the epibranchial corrugations but without the frontal granulations from Sevenweeks Poort (Ladismith, Cape) and Zoetendals Vlei (Bredasdorp), and also nearly typical *sidneyi* from Kaffirkuils River, Still Bay (Transvaal Mus.). Extends northeastwards to Lake Sibayi in Zululand (Lenz), Bulawayo (Balss), and possibly Umtali (Barnard); I have seen a specimen from Chinteche, Nyasaland (Transvaal Mus.).

Remarks.—Krauss regarded his var. *a* as being the true *perlatus* of Milne Edwards.

Potamon (*Potamonautes*) *warreni* Calman

Transvaal River Crab.

Fig. 34, *c*.

1894. Lenz, Ber. Senckenb. Ges., p. 97 (*nilotica*, non M. Edw.).

1918. Calman, Ann. Mag. Nat. Hist. (9), i, p. 234, fig.

1922. Balss, Beitr. Kennt. Land. Süssw. S.W.A., ii, p. 71 (*dubius*, non Br. Cap.).

1924. Colosi, Ark. Zool., xvi, no. 1, p. 9, fig. 6, and pl. 1, figs. 1, 1, *a*.

1935. Barnard, *l. c.*, pp. 483, 484, fig. 1, *d–j*, and chart.

1936. Balss, *l. c.*, p. 179.

Carapace flattish, branchial regions gently convex, post-frontal crest well developed, straight or very slightly concave or sinuous, and sloping gently backwards from middle line to the epibranchial tooth; antero-lateral margin typically with 5–10 teeth, better developed in large than in small examples, often reduced to denticles which decrease in size and pass gradually into granules posteriorly. Otherwise as in *perlatus*. 1st pleopod ♂ as in *perlatus* (fig. 35, *c*).

Length up to 56 mm., breadth 78 mm.

Localities.—See Barnard, 1935. Typical large examples from Potchefstroom (Calman), Kroonstad and Glen (S. Afr. Mus.), Barkly West (Kimberley Mus.); Zak River, Williston (S. Afr. Mus.). The specimen from van Wyk's Vlei (Lenz, 1894, as *niloticus*) is probably *warreni*. Balss (1936) confirms my suggestion (1935) that the Seeheim (Gt. Fish River, S.W.A.) specimens formerly identified by him as

dubius should more correctly be assigned to *warreni*. All these localities are in the Orange River system.

Colosi described specimens collected by Wahlberg at "Port Natal"; as I have not yet seen any specimen approaching *warreni* from anywhere in Natal, and as Wahlberg travelled to the Transvaal, it is reasonable to assume that his specimens were collected farther north than Durban.*

Potamon (*Potamonautes*) *depressus* (Krauss)

1843. Krauss, *l. c.*, p. 38, pl. 2, fig, 4, *a–c* (*Thelphusa d.*).
1910. Stebbing, *l. c.*, p. 294.
1912. Lenz, *l. c.*, p. 7.
1935. Barnard, *l. c.*, p. 484.

Resembling *perlatus* but legs more slender; 4th joint of 5th leg 3–3⅓ times as long as broad.

Length about 26 mm., breadth 36 mm.

Localities.—Near Pietermaritzburg (Krauss); Beenen [*sic* = Weenen] (Lenz); Tugela Gorge, below Mont-aux-Sources (Barnard).

Remarks.—Although the very strongly curved finger of the larger cheliped ♂ renders this form distinct from the great majority of specimens of *perlatus*, it must be noted that this character is not specific (*cf.* Barnard, 1935, p. 483), and there is no other character distinguishing *depressus* from *perlatus* except the more slender legs. As shown above, the legs of very young *perlatus* are more slender than those of the adult, and consequently I am inclined to regard *depressus* as merely a local or perhaps casual variation of *perlatus*. Sometimes the epibranchial corner is very well rounded, and if the carapace is at all inflated in that region, a transition is formed to *inflatus*.

Potamon (*Potamonautes*) *inflatus* (M. Edw.)

1910. Stebbing, *l. c.*, p. 294.
1935. Barnard, *l. c.*, p. 484.

Distinguished by the strongly inflated carapace, which causes the epibranchial corner to appear as if bent downwards. Possibly only a casual variation of *perlatus*.

Localities.—Durban (Milne Edwards); Belfast, Haenertsburg, Marieskop (Barnard).

* See Barnard, 1929, Ann. S. Afr. Mus., xxix, p. 214. Note on locality given by Loven for some of Wahlberg's specimens.

Potamon (*Potamonautes*) *dubius* (Br. Cap.)

1873. Brito Capello, J. Sci. Lisbon, iv, p. 254, pl. 1, figs. 1, *a*, 2, *a* (quoted from de Man).

1905. Rathbun, Nouv. Arch. Mus. Paris, vii, p. 179.

[Not 1922. Balss, *l. c.*, p. 71 = *warreni*. See Balss, 1936.]

Post-frontal crest sloping slightly backwards from middle line, with a distinct sinus immediately internal to the rather strong epibranchial tooth; epibranchial region moderately but not strongly convex.

Locality.—Kunene River, Angola (Brito Capello).

Potamon (*Potamonautes*) *dubius jallae* Nob.

Zambesi River Crab.

Fig. 34, *d*.

1896. Nobili, Boll. Mus. Zool. Torino, xi, no. 262, pp. 1, 2.

1898. de Man, Ann. Mus. Civ. Genova, ser. 2, xix (xxxix), p. 268 (compared with *bottegoi*).

1905. Rathbun, *l. c.*, p. 179, pl. 15, fig. 6.

? 1922. Balss, *l. c.*, p. 72.

1935. Barnard, *l. c.*, p. 486, fig. 1, *k*, *l*, and chart.

1936. Balss, *l. c.*, p. 177, figs. 14, 15, and chart.

Margins less strongly granulate than in the typical form. Balss' fig. 14 (1936) shows a specimen from the Victoria Falls with much more strongly beaded antero-lateral margins than in my specimens from the same locality.

Localities.—Kazungula on Zambesi River (Nobili); Victoria Falls, Chobe River, and Makarikari Pan (Barnard).

Distribution.—Upper Congo system (see chart in Balss, 1936).

Remarks.—In 1935 I doubted whether Balss' specimen from Howick Natal, was correctly assigned, but Balss, 1936, maintains his identification.

Potamon (*Potamonautes*) *bayonianus* (Br. Cap.)

1864. Brito Capello [not seen by me].

1905. Rathbun, *l. c.*, p. 178, pl. 15, fig. 1.

1922. Balss, *l. c.*, p. 72.

Differs from *dubius* and *obesus* by having the antero-lateral margin projecting laterally for a distance equal to the width of orbit (in the two species mentioned this distance is less than width of orbit).

Locality.—Okawango River, South West Africa (Balss).

Distribution.—Kwanza River system, and Benguella district, Angola (Brito Capello).

Potamon (*Potamonautes*) *obesus* (M. Edw.)

Fig. 34, *e*.

1868. Milne Edwards, Nouv. Arch. Mus. Paris, iv, p. 86, pl. 20, figs. 1–4.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 801.

1898. *Id.*, Deutsch Ostafr. iv, Crust. Decap., p. 16.

1905. Rathbun, *l. c.*

1929. Balss. Zool. Jahrb. Abt. Syst., lviii, p. 348.

1935. Barnard, *l. c.*, p. 484.

1942. Chace, *l. c.*, p. 190.

Post-frontal crest sloping slightly backwards from middle line, with a small sinus internal to the small epibranchial tooth; epibranchial region strongly convex, the epibranchial corner sloping downwards.

Localities.—Quilimane (Hilgendorf); Salisbury, Rhodesia (Barnard).

Distribution.—Zanzibar (M. Edwards); Tanganyika; Nyasaland (Balss).

Potamon (*Potamonautes*) *bottegoi* de Man

Fig. 34, *f*, *g*.

1898. de Man, Ann. Mus. Civ. Genova, ser. 2, xix (xxxix), p. 262, pl. 3.

1929. Gordon, Ann. Mag. Nat. Hist. (10), iii, p. 410, fig. 5, *b* (1st plp. ♂).

1933. Rathbun, Bull. Mus. Comp. Zool. Harv., lxxv, p. 258.

Post-frontal crest continuous, nearly straight, curving abruptly backwards just internal to the small epibranchial tooth; frontal margin not emarginate medianly.* No groove on 3rd joint of mxp. 3. In the larger chela basal width of thumb (at beginning of teeth) more than twice ($2\frac{1}{2}$) in greatest width of hand; lower margin with indication of slight concavity between thumb and hand; 4th joint of larger

* This feature may perhaps vary according to the angle from which it is viewed.

cheliped with only the antero-inferior granulate margin ending in a spine or tooth. 5th joint of 2nd and 3rd legs with at most a small blunt tubercle in middle of distal anterior margin. Epibranchial regions rugulose-granulose (but not strongly so).

Locality.—Lower Zambesi valley, Portuguese East Africa (Gordon).

Distribution.—Italian Somaliland and Tanganyika.

Remarks.—Regarded by Balss (1929, *l. c.*, p. 348) as a synonym of *obesus*.

Potamon (*Potamonautes*) *calcaratus* Gordon

Figs. 34, *h*, *i*, 35, *d*.

1929. Gordon, Ann. Mag. Nat. Hist. (10), iii, p. 405, figs. 1–4, 5, *a*.

Very similar to *bottegoi*, but post-frontal crest less sharp and conspicuous, and more or less interrupted; frontal margin medianly emarginate; * basal width of thumb of larger chela half (in Gordon's figure slightly exceeding half) the greatest width of hand, lower margin of hand and thumb convex throughout (or at least not concave), finger and thumb compressed, upper margin of finger and lower margin of thumb being narrowly rounded or almost sharp-edged; 4th joint of larger cheliped with *both* the antero- and the postero-inferior granulated margins ending in a spine or tooth; 5th joint of 2nd and 3rd legs with a distinct spine in middle of distal anterior margin; epibranchial regions quite smooth.

Length up to 28 mm., breadth 40 mm.

Localities.—Lower Zambesi valley, Portuguese East Africa, and Chirinda Forest, S. Rhodesia (Gordon); Wanetsi River, north of Lourenzo Marques, P.E.A. (S. Afr. Mus.); Pafuri River (Limpopo system), near Punda Maria, N.E. Transvaal (Transvaal Mus.).

Remarks.—This species is apparently closely allied to *bottegoi*, though distinguished by certain characters. The value of these characters, and the specific distinctness of the two forms, is rendered somewhat doubtful by the fact that both are found in approximately the same locality. Further investigation on the spot would be desirable.

On Miss Rathbun's 1921 definitions of the subgenera *Potamonautes* and *Potamon* this species should really belong to the latter, but as the authoress herself remarks, there are so many intergrading forms that strict definitions of subgenera are impossible. As Dr. Gordon placed her species in *Potamonautes*, it is left there.

* This feature may perhaps vary according to the angle from which it is viewed.

Potamon (*Potamonautes*), cf. *johnstoni* (Miers)

Cf. 1929. Balss, *l. c.*, p. 343, and 1936, *l. c.*, p. 180, fig. 17 (1st plp. ♂).

1942. Chace, *l. c.*, pp. 190 and 214.

Three ♂♂ from Beira (23, 28, and 50 mm. in breadth), as regards the ordinary external features, are typical *perlatus*, and illustrate how in former years *perlatus* came to be recorded from Tanganyika and other East African localities. The terminal piece of the 1st pleopod ♂, however, is quite different from that of *perlatus*; it bears a sharp convex keel, on the external (ventral) surface of which is a less conspicuous ridge; the seminal groove, in which the 2nd pleopod lies runs behind (dorsal) to the sharp keel (fig. 35, *e*). In this respect these Beira specimens differ also from two specimens from Kilimanjaro and Tanganyika (no detailed locality for the latter), which externally resemble *perlatus* just as closely; here there are *two* sharp and even more prominent keels, *between* which the seminal groove runs (fig. 35, *f*, *g*).

Balss (1929, p. 344) said of a specimen of *johnstoni* from Lindi (Tanganyika) that, if it had had no locality label, he would unhesitatingly have identified it as *perlatus*!

Family ATELECYCLIDAE.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, pp. 4, 5, 95, 96 (subfam. of *Cancridae*).

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 481, 484.

1910. Stebbing, *l. c.*, p. 310 (*Cancridae*).

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 148.

Carapace subcircular or suboval, never very broad, regions sometimes defined, sometimes not; front entire or dentate. 1st antennae folding longitudinally; flagellum of 2nd antennae setose (when well developed), sometimes rudimentary, or absent.

Remarks.—Stebbing evidently preferred to follow Alcock's arrangement in which the *Atelecyclinae* were regarded merely as a subfamily of the *Cancridae*. It must be admitted that the reasons for separating them as independent families are rather unimportant. The *Cancridae* have a broad, transversely oval carapace, and a short glabrous flagellum on the 2nd antenna. The family includes *Cancer pagurus* the edible Great Crab of Europe.

Key to the South African Genera.

Flagellum of ant. 2 present in both genera.

1. Regions not defined. Front bilobed. Peduncle of ant. 2 not visible in dorsal view, flagellum short . *Kraussia.*
2. Regions fairly well defined. Front tridentate. Peduncle of ant. 2 visible in dorsal view, flagellum long . *Atelecyclus.*

Gen. Kraussia Dana

1902. Rathbun, Bull. Mus. Comp. Zool. Harv., xxxix, p. 132.
1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 87.
1910. Stebbing, *l. c.*, p. 310.
1938. Balss, Medd. Göteb. Mus., lxxv, p. 26 (key to species).

Carapace subcircular, but antero-lateral margins much longer than the strongly convergent postero-lateral margins, regions not defined, front (between inner orbital teeth) prominent, broadly bilobed, each lobe may be divided into two lobules. Basal joint of ant. 2 fixed, only the 3rd peduncular joint and the short flagellum visible in dorsal view. Chelipeds short, massive, finger and thumb stumpy, apices blunt, Legs stout, dactyls cultrate. Sternum and abdomen narrow, the latter with 5 segments in ♂, and first 2 segments visible in dorsal view in both sexes. Genital openings in ♂ coxal.

Remarks.—The dactyls of the legs are reminiscent of those of *Matuta*, *Ranina*, and *Nautilocorystes*.

Kraussia rugulosa (Krauss)

Fig. 36, *a–c*.

1843. Krauss, Südafr. Crust., p. 26, pl. 1, fig. 5, *a–d* (*Platyonichus r.*).
1887. de Man, Arch. Naturg., liii, p. 343, pl. 14, fig. 2.
1910. Stebbing, *l. c.*, p. 310.
1935. Ward, Bull. Raffles Mus., no. 9, p. 10, pl. 1, fig. 7 (*pro-porcellana*).
1938. Balss, *l. c.*, p. 27, fig. 10 (cheliped).

Carapace shiny, setose only around margins, with numerous transverse lines of minute granules, in places close enough together to give a squamose appearance; front bilobed, each lobe truncate, finely denticulate; upper orbital margin with one fissure in middle and another near outer orbital tooth; antero-lateral margin serrate, 4 of the serrae being larger than the others. A small tubercle on anterior border of eye-stalk near the cornea. Cheliped, upper margin of 4th joint denticulate, with long setae, wrist with 2 denticles on inner

apex and granules on upper distal portion, outer surface of hand with lines of fine granules and a few scattered larger granules, finger with grooves and serrulate ridges above, finger and thumb gaping in both sexes, their apices spooned. Legs setose, dactyls cultrate, the outer (anterior) margin thickened and flattened only at base in 2nd–4th legs, but along whole margin in 5th leg. 1st pleopod ♂ very slender,

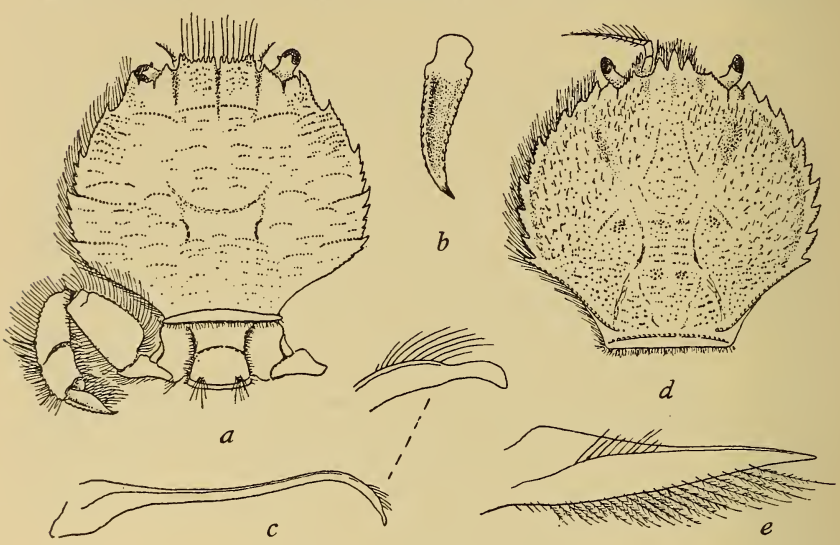


Fig. 36.—*Kraussia rugulosa* (Krauss). *a*, carapace, with 1st and 2nd abdominal segments, and left 5th leg. *b*, outer surface of dactyl of left 5th leg. *c*, 1st pleopod ♂, with apex further enlarged.
Atelecyclus septemdentatus (Mont.). *d*, carapace. *e*, 1st pleopod ♂.

2nd pleopod very short, only just entering groove at base of 1st pleopod. Abdomen of ♀ not nearly covering the numerous eggs; in both sexes two tufts of setae on the 2nd segment.

Length ♂ 13 mm., ovig. ♀ 11 mm.; breadth ♂ 15 mm., ♀ 12 mm. Greyish.

Localities.—Durban (Krauss); Durban and Scottburgh, Natal (S. Afr. Mus.); mouth of Umgazana River, 10 miles south of Port St. Johns (S. Afr. Mus.).

Distribution.—East coast of Africa, Indo-Pacific to Hawaiian Is.

Gen. Atelecyclus Leach

1910. Stebbing, *l. c.*, p. 310.

1933. Monod, Bull. Et. Sci. Afr. occid. Franç., xv, p. 45 (with fig. 11, A, B).

Carapace subcircular, postero-lateral margins shorter than the antero-lateral margins, and strongly convergent, regions fairly well defined, front tridentate. Basal joint of ant. 2 fixed, its denticulate distal margin and the 2 following peduncular joints and the long flagellum visible in dorsal view. Chelipeds short, finger and thumb rather short, apices acute. Legs short, dactyls strong. Sternum and abdomen narrow, the latter with 5 segments in ♂, and first 2 segments visible dorsally in both sexes. Genital openings in ♂ coxal.

Atelecyclus septemdentatus (Mont.)

Fig. 36, *d*, *e*.

1853. Bell, Hist. Brit. Stalk-eyed Crust., p. 153, fig. (*heterodon*).
1904. Doflein, D. Tiefsee Exp., vi, p. 90.
1910. Stebbing, *l. c.*, p. 310.

Carapace granulate, granules in places aggregated in twos and threes or small groups, with scattered setae, and thickly setose around margins; front tridentate, the median tooth usually larger than the others; upper orbital margin with 2 fissures, the lobe between them somewhat dentiform; antero-lateral margin with 10 teeth (incl. outer orbital tooth), alternatively larger and smaller, but the 4 hindmost ones subequal, or gradually decreasing backwards; the whole margin (incl. front) finely denticulate-granulate, the postero-lateral margin ending on the dorsal surface and not continuous with the hind margin. Sometimes an indication of a granule on anterior margin of eye-stalk. Cheliped setose, wrist with a tooth on inner margin, 2 knobs on upper surface, and granulate on outer surface, hand with 4 lines of granules on outer surface, lower and upper surfaces granulate, the latter also with 2–5 larger conical tubercles, finger granulate on upper surface. Legs more or less granulate on upper surfaces, setose, the setae on outer surfaces of 6th joint and dactyls short, close, bristly. 1st pleopod ♂ stout, straight, tapering evenly; 2nd pleopod subequal in length to 1st.

Length up to ♂ 28 mm., breadth 29 mm., ♀ smaller. Pinkish or reddish, with red spots, chelipeds red, finger and thumb blackish.

Localities.—False Bay (Stebbing); False Bay, Mossel Bay, Algoa Bay, 19–55 fathoms (S. Afr. Mus. 5 ♂♂).

Distribution.—North Atlantic south to Bay of Biscay, Mediterranean.

Remarks.—As Stebbing remarked, the finding of this species in South African waters greatly extended its known southward range. Whether or not any significance is to be attached to the fact, it should

be noted that all the South African localities are in bays where large numbers of ships anchor, and not in any intermediate localities.

A second species, *cruentatus* Desm., occurs as far south as the Cape Verdes and Senegal; and it has been suggested that the two species are merely extreme forms of one species (Balss, 1921, Beitr. Kennt. Meeresf. Westafr., iii, p. 55). *A. cruentatus* has the carapace distinctly broader than long, with blunter and more rounded antero-lateral teeth.

I have not been able to trace the reference given by Doflein: "1798. Montagu, Trans. Linn. Soc. Lond., vol. 2, pl. 1." In the 1813 paper, although the description is headed *Cancer Hippa septemdentatus*, the explanation of the plate has *Cancer septemdentatus*.

Family XANTHIDAE.

1898. Alcock, J. Asiat. Soc. Bengal, lxvii, p. 69.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 482, 484.

1910. Stebbing, *l. c.*, p. 296.

1925. Odhner, Medd. Göteb. Mus., xxxvii (Göteb. K. Vet. Handl., xxix), pp. 1–92 (part 1).

1925. Hyman, Proc. U.S. Nat. Mus., lxvii, 22 pp., 14 pls. (larval stages).

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 233 (American genera).

Carapace transversely oval, hexagonal, or subquadrate, rarely subcircular, front broad or very broad, never rostriform. 1st antennae folding transversely or obliquely; flagellum of antenna 2 short, slender. Genital openings in ♂ coxal (nearly always).

Remarks.—Not sharply separated from the *Goneplacidae* (Borradaile, p. 482). A very large family of mostly shallow-water and littoral species, particularly abundant in tropical and subtropical regions, and, as regards habitat, dwelling under or among rocks and coral reefs. In general they are compact in shape, with hard and solid carapace, robust and powerful chelipeds, and short walking legs (for general remarks see Borradaile, 1902, F. Geogr. Mald. Laccad. Archip., i, pp. 237 *sqq.*).

The correct identification of the species is often a matter of difficulty, and a large amount of synonymy has arisen in the past (*cf.* Odhner, *l. c.*). A satisfactory division of the family into subfamilies has not been made, as Miss Rathbun remarks (*l.* c.); Alcock's and Borradaile's divisions do not quite coincide. So far as the South African fauna is concerned, a key to the comparatively few genera will meet the case; but even here there are three genera the differences between which are

difficult or impossible to state in words in a key (*Xantho* s.s., *Actaea*, and *Lachnopodus*).

Maxillothrix Stebb. 1921, as Odhner (1925, p. 85) has stated, does not belong to this family.

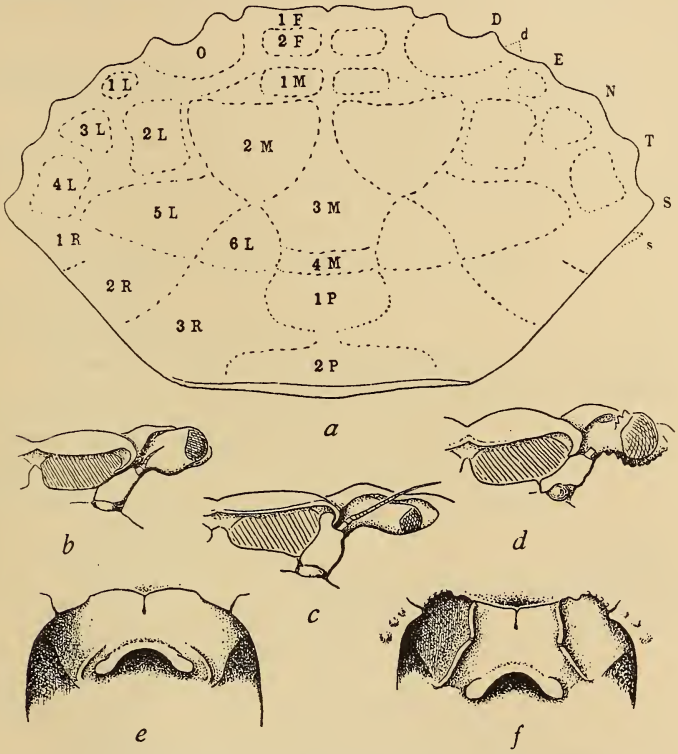


FIG. 37.—*a*, diagram of a Xanthid crab to show areoles (after Dana).

F = frontal. L = antero-lateral (anterior branchial). M = median (gastric). O = orbital. P = posterior (cardiac-intestinal). R = postero-lateral (posterior branchial). *d* and *s*, occasional teeth.

Ventral views of front, socket of antenna 1 (diagonally shaded), antenna 2, and orbit. *b*, *Liomera bellus* (Dana). *c*, *Neoliomera sabaea* (Nob.). *d*, *Actaea rüppellii* (Krss.).

Ventral view of buccal cavity, appendages removed. *e*, *Hyperolissa* (e.g. *Carpilius*), endostome ridges absent or confined to hind part of cavity only. *f*, *Hyperomerista* (e.g. *Eriphia*), endostome ridges extending to anterior margin of buccal cavity.

The main regions of the Brachyuran carapace are in this family frequently subdivided into areoles, which are of some systematic importance (fig. 37, *a*).

Alcock (*l. c.*), following Dana, has divided the family into two main sections:

Hyperolissa, in which the ridges defining the efferent branchial canals are either absent, or confined to the hinder part of the buccal cavity (fig. 37, *e*). Key to genera, p. 201.

Hyperomerista, in which these endostomal ridges are continued up to the anterior border of the buccal cavity (fig. 37, *f*). Key to genera, p. 247.

It is usually easy to tell to which section a specimen belongs, but not always (*e.g. Parapilumnus pisifer* and *Pilumnus hirsutus*).

As a quick guide to preliminary identification, some of the genera having certain outstanding features in common may be grouped together.

- Tips of finger and thumb of chelipeds spooned . . . .
  - *Zosimus.*
  - *Zozymodes.*
  - *Xantho* (*Leptodius*).
  - *Chlorodiella.*
  - *Phymodius.*
  - *Chlorodopsis.*
  - *Actaea tomentosa.*
  - *Etisus.*
  - [*Daira* Mauritius].
- Flagellum of antenna 2 excluded from orbit . . . .
  - *Chlorodopsis* adult.
  - *Etisus.*
  - *Eurüppellia.*
  - *Eriphia.*
  - *Trapezia.*
  - *Tetralia.*
  - *Quadrella.*
  - [Daira.]
- Upper edge of legs keeled
  - on 4th joint only . . . *Medaeus granulosus.*
  - on 4th–6th joints, and sometimes also hand of chelipeds .
    - *Atergatis.*
    - *Zosimus.*
    - *Lophozozymus.*
    - *Platypodia.*
- Upper edge of 5th and 6th joints of legs bicarinate . .
  - *Zozymodes.*
  - *Actaea cavipes.*
- Walking legs "biunguiculate"
  - strongly so . . . *Phymodius monticulosus.*
  - not so strongly . .
    - *Etisus laevimanus.*
    - *Chlorodiella niger* (*fide* Krauss).
- Dark colour of thumb of chelipeds extending on to palm of hand . . . . . .
  - *Phymodius.*
  - *Chlorodopsis.*
  - *Xantho quinquedentatus.*
  - *Etisus laevimanus.*
  - *Actaea tomentosa.*

Pleopod 2 ♂ as long as, or longer than, pleopod 1 . .	*Carpilius.* *Menippe.* *Dairodes.* *Epixanthus.* *Eriphia.*
Abdomen of ♂ of 7 distinct segments	*Actumnus.* *Pilumnoides.* *Menippe.* *Pilumnus.* *Tetralia.*

Key to the South African Genera of Hyperolissa.

I. Flagellum of ant. 2 not excluded from orbit (figs. 37, *b*, *c*, *d*).*
- A. Hind margin of carapace not costate, *i.e.* without a raised rim (or only a very feeble one) (fig. 38, *a*, *c*, *e*, *f*).
  - 1. Walking legs cylindrical.
    - *a*. A single large molariform tooth on cutting-edge of thumb of larger cheliped . *Carpilius.*
    - *b*. Three large teeth on thumb of larger cheliped . . . . . *Atergatopsis.*
  - 2. Upper margin of 4th–6th joints of legs keeled, and sometimes also 4th and 6th joints of cheliped.
    - *a*. Carapace smooth . . . . . *Atergatis.*
    - *b*. Carapace granulate . . . . *Platypodia.*
- B. Hind margin of carapace costate (fig. 39, *d*, etc.).
  - 1. Pterygostomial region with a cavity . . *Hypocolpus.*
  - 2. Pterygostomial region without cavity.
    - *a*. Tips of finger and thumb of chelipeds spooned.
      - i. Hand of chelipeds and 4th–6th joints of legs keeled on upper margin . *Zosimus.*
      - ii. 5th and 6th joints of legs bicarinate (fig. 39, *b*) . . . . *Zozymodes.*
      - iii. Legs and chelipeds not keeled.
        - *a*. Fronto-orbital border about half width of carapace.
          - * Carapace with uniform vesicular granules concealed by short black felt . . *Actaea tomentosa.*
          - ** Carapace feebly and irregularly granulate *Xantho* (*Leptodius*).

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* In the adult of *Chlorodopsis* the prolongation of the basal joint usually completes, and almost or quite excludes the flagellum from, the orbit.

β. Fronto-orbital border more than half width of carapace.
* Basal joint of ant. 2 running up between front and suborbital tooth. Carapace not granular or hairy.
† Regions faintly marked . . *Chlorodiella.*
†† Regions well marked (fig. 40, *a*, *e*) . *Phymodius.*
** Basal joint of ant. 2 prolonged into orbit. Carapace granular and hairy, regions and areoles well marked . . . *Chlorodopsis.*

b. Tips of finger and thumb of chelipeds pointed.
i. 4th and 6th joints of chelipeds keeled on upper and lower margins, 4th–6th joints of legs keeled on upper margin . . . . . *Lophozozymus.*
ii. Chelipeds and legs not keeled.
a. Fronto-orbital border half or less than half width of carapace.
* Antero-lateral margin continued beneath orbit to buccal cavity . *Medaeus.*
** Antero-lateral margin not so continued.
† Length of carapace $\frac{2}{3}$–$\frac{3}{4}$ the width. Differences not possible to state in words (see figs. 41 and 43) . *Xantho* (*Xantho*). *Actaea.* *Lachnopodus.*
†† Length of carapace nearly twice in width.
§ Basal joint of ant. 2 between front and suborbital tooth (fig. 37, *b*) . *Liomera.*

§§ Basal joint of ant. 2 embracing the down-turned lateral edge of front (fig. 37, *c*) .	*Neoliomera.*
β. Fronto-orbital border more than half width of carapace .	*Xanthias.*
II. Flagellum of ant. 2 excluded from orbit (fig. 45, *c*). Finger and thumb of chelipeds apically spooned . . .	*Etisus.*

Gen. Carpilius Leach

1898. Alcock, *l. c.*, p. 78.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 234.

1930. Rathbun, *l. c.*, p. 239.

Large and heavily built. Carapace broad, very convex, smooth, without any indication of regions, antero-lateral margin thick, arched, entire, a prominent knob at junction of antero- and postero-lateral margins, hind margin not costate; front shallowly 3-lobed, the middle lobe more or less bilobed. Basal joint of ant. 2 entering cleft between front and inner suborbital tooth, flagellum shorter than orbit. Chelipeds massive, unequal, a single large molariform tooth on cutting-edge of thumb. Legs smooth, cylindrical. Abdomen of ♂ with 3rd–5th segments fused, but only the suture between 3rd and 4th segments obliterated. Pleopod 2 ♂ slender, longer than pleopod 1 (fig. 38, *b*).

Key to the South African Species.

1. Front deflexed, median lobe definitely bilobed. Large pale-edged red spots symmetrically arranged on carapace .	*maculatus.*
2. Front strongly deflexed, median lobe feebly bilobed. Irregular marbling of red on a lighter ground-colour .	*convexus.*

Carpilius maculatus (Linn.)

Spotted Rock Crab.

Figs. 37, *e*, 38, *a*, *b*.

1849. Milne Edwards in Cuvier, Règne Anim. Crust. Atlas, pl. xi, figs. 2 (coloured), 2, *a*.

1898. Alcock, *l. c.*, p. 79 (references).

1926. McNeill, Austral. Zoolog., iv, p. 312, pl. 41.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 86, pls. 39–42.

[Not Stebbing 1920 = *convexus*.]

Carapace pitted and foveolate in anterior and antero-lateral parts; 2 gastro-cardiac depressions; otherwise quite smooth and glabrous. Front obliquely deflexed, just visible on dorsal view, median lobe decidedly bilobate and separated by a deep hollow from each lateral lobe.

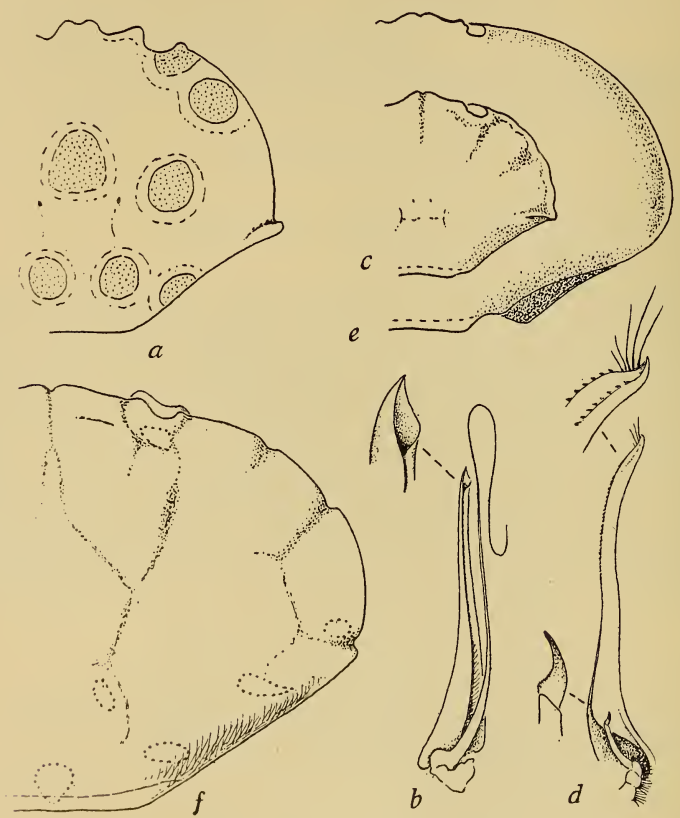


Fig. 38.—*Carpilius maculatus* (Linn.). *a*, carapace. *b*, right 1st and 2nd pleopods ♂, with apex of 1st further enlarged.
Atergatis floridus (Linn.). *c*, carapace. *d*, left 1st and 2nd pleopods ♂, with apex of 2nd further enlarged.
Atergatis roseus (Rupp.). *e*, carapace.
Atergatopsis signata (Ad. & Wh.). *f*, carapace.

Length up to 85 mm., breadth 115 mm. Buff or orange, with eleven (or more) blood-red spots symmetrically arranged, each surrounded by a pale yellow or cream border: one spot on hind margin of orbit, one near antero-lateral margin, 3 across middle of carapace,

and 4 across hinder part. These spots apparently do not fade in specimens kept long in spirit.

Locality.—Durban (S. Afr. Mus.).

Distribution.—Mauritius, Indo-Pacific.

Carpilius convexus (Forskal)

1775. Forskal, Descr. Anim., p. 88.

1830. Rüppell, Beschr. 24, Krabben roth. Meer., p. 13, pl. 3, fig. 2, pl. 6, fig. 6.

1834. Milne Edwards, Hist. Nat. Crust., i, p. 382, pl. 16, figs. 9, 10.

1898. Alcock, *l. c.*, p. 80 (references).

1920. Stebbing, *l. c.*, p. 235 (*maculatus*, non Linn.).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 89, pls. 43–45.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 156, fig. 40 (plp. 1, 2 ♂).

Scarcely worthy of specific distinction from *maculatus*, but separated by the coloration, and: front vertically deflexed, in fact almost curving ventrally, invisible in dorsal view, median lobe very shallowly or scarcely at all bilobed, and separated from each lateral lobe by only a shallow emargination.

Length up to 65 mm., breadth 88 mm. Orange or reddish, irregularly marbled with darker red, which fades entirely in specimens kept long in spirit.

Localities.—Mozambique (Stebbing); Durban and Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius, Red Sea, east coast of Africa, Indo-Pacific.

Remarks.—The small specimen referred by Stebbing to *maculatus* has the front, and had (when caught) the coloration, of *convexus*. Paulson considered *convexus* as only a variety of *maculatus*.

Gen. Atergatopsis M. Edw.

1920. Stebbing, Ann. Durban Mus., ii, p. 267.

1939. Ward, Amer. Mus. Novit., 1049, p. 5.

Carapace broad, convex, smooth or somewhat lumpy, but not areolate, front narrow, sinuate or indistinctly 4-lobate, antero-lateral margin regularly arched, neither keeled nor lobulate, with a knob at junction with the shorter postero-lateral margin; hind margin feebly costate. Basal joint of ant. 2 touching side edge of front. Chelipeds subequal, hand not keeled on upper margin, 3 large teeth on cutting-

edge of thumb. Legs nearly cylindrical, somewhat compressed but not keeled, moderately long. Abdomen of ♂ with 3rd–5th segments usually fused.

Remarks.—Very similar to *Carpilius.*

Atergatopsis signata (Ad. & Wh.)

Fig. 38, *f.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 787.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 349, pl. 47, fig. 7 (♂ abd.) (*flavo-maculatus*).

1910. *Id.*, Voeltzkow's Reise, ii, p. 546 (*flavo-maculatus*).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 214, pl. 17, fig. 7.

1920. Stebbing, *l. c.*, p. 267.

1942. Ward, Mauritius Inst. Bull., ii, p. 86.

Front with deep median notch. Cheliped, outer surface of hand with smooth and feeble longitudinal ridge separating the upper rugose portion from the smooth lower portion; 3 large teeth on cutting-edge of thumb, more noticeable in the larger cheliped than in the smaller one.

Length up to 60 mm., breadth 88 mm. Deep red with white dots or patches, finger and thumb of chelipeds black with white tips, dactyls of legs with brown felt, ungues blackish.

Localities.—Mozambique (Hilgendorf); Europa Is., Mozambique Channel (Lenz); Durban (Stebbing).

Distribution.—Mauritius, Zanzibar, Seychelles, Chagos.

Gen. Atergatis de Haan

1898. Alcock, *l. c.*, p. 94.

1910. Stebbing, *l. c.*, p. 296.

1917. *Id.*, Ann. Durban Mus., ii, p. 6.

1920. *Id.*, *ibid.*, ii, p. 267.

1925. Odhner, Medd. Göteb. Mus., xxxvii, p. 83.

Carapace very broad, convex, smooth, regions only very faintly, if at all, indicated, antero-lateral margin arched, either sharply keeled or blunt, but definitely demarcated by a rim, front narrow, more or less deflexed, shaped like a cupid's bow, hind margin not or only feebly costate. Basal joint of ant. 2 touching the front, flagellum

shorter than orbit. Chelipeds subequal. Legs with upper margin of 4th–6th joints, and lower margin of 5th and 6th joints keeled. Abdomen of ♂ with 3rd–5th segments fused. Pleopod 2 ♂ very short (fig. 38, *d*).

Key to the South African Species.

1. Antero-lateral margin forming a tooth at junction with postero-lateral margin. Upper margin of hand of cheliped keeled . . . . . *floridus.*
2. No tooth at junction of antero- and postero-lateral margins. Upper margin of hand of cheliped rounded . . *roseus.*

Atergatis floridus (Linn.)

Fig. 38, *c*, *d*.

1705. Rumph, Amboinsch. Raritietkam, p. 16, pl. 8, fig. 5.

1838. McLeay, Annulosa S. Afr., p. 59 (*compressipes*).

1898. Alcock, *l. c.*, p. 98 (references).

1910. Stebbing, *l. c.*, p. 296 (*ocyroe*).

1917. *Id.*, *l. c.*, p. 7, pl. 2.

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 382 (*ocyroe*).

1934. Gordon, Res. Sci. Ind. Néerland, iii, fasc. 15, p. 25, fig. 14 (1st plp. ♂).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 94, pls. 47, 48.

Carapace somewhat lumpy, the regions faintly defined by broad shallow depressions, antero-lateral margin sharp, ending in a tooth at junction with postero-lateral margin. Upper edge of 4th joint of cheliped and hand sharply keeled.

Length up to 37 mm., breadth 54 mm. Yellowish, orange, or greenish, more or less symmetrically marbled or spotted with darker red or brown, the blotches often surrounded by a fine white line; chelipeds, legs, external maxillipeds, sternum and abdomen also more or less spotted; finger and thumb of cheliped black with white tips.

Localities.—Mouth of Umlaas River (Krauss); Isipingo (Stebbing); Port St. Johns, Durban, and Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius, Red Sea, Indo-Pacific to Japan and Australia.

Atergatis roseus (Rüpp.)

Fig. 38, *e*.

1830. Rüppell, Beschr. 24 Krabben, p. 13, pl. 3, fig. 3, pl. 6, fig. 7 and p. 15, pl. 3, fig. 4 (*marginatus*).

1843. Krauss, Südafrik, Crust., p. 28 (*marginatus*).

1910. Stebbing, *l. c.*, p. 297.

1917. Id., Ann. Durban Mus., i, p. 437.

1917. *Id.*, *ibid.*, ii, p. 7, footnote.

1920. *Id.*, *ibid.*, ii, p. 267.

Carapace smooth, without any indication of regions, antero-lateral margin passing into the postero-lateral margin without any projection. Upper margin of hand of cheliped rounded; inner surface of wrist with several tufts of short bristles.

Length up to 61 mm., breadth 102 mm. Pinkish, rose-red, or salmon, with or without a whitish border around the carapace, finger and thumb of cheliped black with white tips.

Localities.—Natal (Krauss); Durban (Stebbing, and S. Afr. Mus.); Port St. Johns (S. Afr. Mus.).

Distribution.—Mauritius, Red Sea, Indo-Pacific.

Remarks.—I have seen a specimen (Port Elizabeth Mus.) said to have been caught at Humewood, Algoa Bay.

Gen. Platypodia Bell

1835. Bell, Trans. Zool. Soc. Lond., i, p. 336.

1862. Milne Edwards, Ann. Sci. Nat. (4), xviii, p. 43 (*Lophactaea*).

1898. Alcock, J. Asiat. Soc. Bengal, lxvii, p. 99 (*Lophactaea*).

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 246.

Carapace moderately broad, regions usually well defined, granulate (except in *anaglypta*); antero-lateral margin crest-like, cut into blunt lobes by narrow fissures. Basal joint of ant. 1 touching front, flagellum in orbital gap. Chelipeds subequal, tips of finger and thumb pointed. Legs with upper margins of 4th–6th joints keeled. Abdomen of ♂ with 3rd–5th segments fused.

Platypodia granulosa (Rüpp.)

1830. Rüppell, Beschr. 24 Krabben, p. 24, pl. 5, fig. 3, pl. 6, fig. 18 (*Xantho g.*).

1834. Milne Edwards, Hist. Nat. Crust., i, p. 377, pl. 16, figs. 1–3 (not 14, as M. Edw. himself gives) (*Cancer limbatus*).

1851. Bianconi, Spec. Zool. Mosambic., fasc. 5, p. 82 (*Cancer limbatus*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 787 (*Lophactaea g*).

1898. Alcock, *l. c.*, p. 101 (references) (*Lophactaea g.*).

1922. Balss, Arch. Naturg., lxxxviii, p. 125.

1934. Gordon, Res. Sci. Ind. orient. Néerland, iii, fasc. 15, p. 27, fig. 15, *a* (1st plp. ♂).

1938. Balss, Medd. Göteb. Mus., lxxv, p. 37.

Carapace with regions well defined, and numerous evenly spaced, more or less pearly granules. Outer surface of wrist and hand of chelipeds with granules arranged more or less in longitudinal rows.

Length *ca.* 25 mm. Brown-yellow, finger and thumb of chelipeds horn colour (Rüppell).

Locality.—Mozambique (Bianconi, Hilgendorf).

Distribution.—Red Sea, east coast of Africa, Indo-Pacific.

Remarks.—I have seen no specimens. The assumption that the hind margin of carapace is not costate is based on Rüppell's and Milne Edwards' figures; the position of the genus in the key on p. 201 is perhaps incorrect.

Gen. Hypocolpus Rathbun

1861. Heller, Abh. zool-bot. Ges. Wien, p. 7 (*Hypocoelus*, nom. preocc.).

1897. Rathbun, Proc. Biol. Soc. Wash., xi, p. 164.

1898. Alcock, *l. c.*, p. 111 (*Hypocoelus*).

1924. Stebbing, Ann. S. Afr. Mus., xix, p. 2.

1934. Balss, Faune Col. Franç., v, pp. 510–513.

A large oval or reniform cavity in each pterygostomial region.

Hypocolpus diverticulatus (Strahl)

1834. Milne Edwards, Hist. Nat. Crust., i, p. 376 (*sculptus*, nom. preocc. Herbst 1794).

1861. Strahl, Archiv Naturg., xxvii, p. 101.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 788 (*sculptus* M. Edw.).

1910. Bouvier, Bull. Mus. Paris, no. 7, p. 376 (*sculptus* M. Edw.).

1924. Stebbing, *l. c.*, p. 2 (*exsculptus*, non Herbst 1790).

1934. Balss, Faune Col. Franç., v, p. 510 (synonymy).

Length.—21 mm., breadth 29 mm. (Stebbing); 53 × 74 mm. (Heller).

Locality.—Mozambique (Stebbing).

Distribution.—Mauritius, Madagascar, Ibo (Portuguese East Africa), Red Sea, east coast of Africa, Indo-Pacific.

Remarks.—The correct S. Afr. Mus. Reg. no. for the specimen recorded by Stebbing is A2211. The specimen was not returned by Stebbing, and I have seen no specimens.

Gen. Zosimus Leach

1825. Leach in Desmarest. Consid. Crust., p. 105.
1834. Milne Edwards, Hist. Nat. Crust., i, p. 383 (*Zozymus*).
1898. Alcock, *l. c.*, p. 103 (*Zozymus*).
1917. Stebbing, Ann Durban Mus., i, p. 436.
1925. Odhner, Medd. Göteb. Mus., xxxvii, p. 83 (*Zozymus*).
1938. Balss, *ibid.*, lxxv, p. 38 (*Zoozymus*).

Carapace moderately convex, regions distinct and subdivided into numerous areoles and lobules; antero-lateral margin scalloped, sharp-edged, but not forming an up-turned rim, postero-lateral margins straight, strongly convergent; orbit subcircular, with 4 suture lines on outer rim. Basal joint of ant. 2 produced at inner apex and more or less embracing the deflexed side margin of front (*cf.* fig. 37, *c*), flagellum shorter than orbit. Chelipeds equal, finger and thumb apically blunt and hollowed. Legs with upper margin of 4th–6th joints sharp-edged. Abdomen ♂ with 3rd–5th segments fused.

Zosimus aeneus (Linn.)

Fig. 39, *a*.

1875. Paulson, Red Sea Crust., p. 16, pl. 4, figs. 3, 3, *a*, *b* (*Atergatis a.*).
1898. Alcock, *l. c.*, p. 104.
1917. Stebbing, *l. c.*, p. 437.
1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 99, pls. 50–53 (*Zozimus a.*).

Areoles smooth and polished, but variable in development, the intervening grooves mostly smooth and naked except in the marginal areas; 4th antero-lateral lobe somewhat dentiform. Wrist and hand of cheliped rugose, the furrows more or less wrinkled or meandering, upper margin of hand keeled, with a longitudinal groove along base of keel. 5th and 6th joints in 2nd–4th legs, and 4th–6th joints of 5th leg with longitudinal and transverse grooves on outer surfaces, inner upper edge fringed with longish hairs, lower edge of 6th joint and unguis setose; hind margin of 2nd–5th coxae produced in a rounded lobe.

Length up to 55 mm., breadth 83 mm. Reddish or scarlet, more or less mottled, some of the tubercles on outer surface of hand white, finger and thumb brown, the colour not extending on to hand.

Localities.—Durban (Stebbing); Umhlali, Natal, and Impengazi, north of St. Lucia Bay (coll. T. A. Stephenson); Port St. Johns (S. Afr. Mus.).

Distribution.—Mauritius, east coast of Africa, Indo-Pacific.

Gen. Zozymodes Heller

1861. Heller, SB. Ak. Wiss. Wien, xliii, p. 327 (*fide* Neave).

1925. Odhner, Medd. Göteb. Mus., xxxvii, p. 82.

1938. Balss, *ibid.*, lxxv, p. 38 (*Zoozymodes*).

Like *Zozimus*, but antero-lateral margin of carapace forming an up-turned rim, and chelipeds unequal, legs keeled, with small coxal lobes, basal joint of ant. 2 touching but only very slightly embracing side-edge of front, 2nd pleopod ♂ very short.

Zozymodes xanthoides (Krauss)

Fig. 39, *b*, *c*.

1843. Krauss, Südafrik. Crust., p. 32, pl. 1, fig. 6, *a–e*. (*Pilumnus x.*).

1861. Heller, SB. Ak. Wiss. Wien, xliii, p. 328, pl. 2, figs. 16–18 (*carinipes*).

1875. Paulson, Red Sea Crust., p. 18, pl. 4, figs. 4, 4, *a–d* (*carinipes*).

1910. Stebbing, *l. c.*, p. 301 (*Pilumnus x.*).

1912. Lenz, Ark. Zool., vii, no. 29, p. 6 (*carinipes*).

1917. Stebbing, Ann. Durban Mus., ii, p. 9 (*Pilumnus x.*).

1925. Odhner, *l. c.*, p. 82.

1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 124, fig. 15.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 156, fig. 39, C, D (plp. 1, 2 ♂).

Front $\frac{1}{3}$ the greatest width of carapace, slightly arcuate, with median notch and a notch at junction with supra-orbital margin; antero-lateral margin cut into 4 blunt teeth, the first two especially blunt; main regions fairly distinct, feebly subdivided, 2 M incompletely divided; whole surface granulate, the granules of uniform size but slightly larger laterally. Wrist and hand of cheliped granulate, the latter with a blunt ridge at basal angle of upper margin, no longitudinal furrow, outer surface pilose. Legs with upper margins of 4th–6th joints sharply keeled, the 5th and 6th joints in addition with a second keel along hinder surface; hinder surface of 5th distally, and the whole of 6th joint and dactyl setose. Pterygostomial regions, external maxillipeds, sternum and abdomen with short close pile.

Length 9 mm., breadth 13 mm. Smallest ovig. ♀ 6·5 mm. in length. Reddish or orange (Krauss: violet), with yellowish spots on margins of carapace and on legs, finger and thumb of cheliped blackish.

Localities.—Durban (Krauss, Stebbing); Amanzemtoti (Lenz);

Scottburgh, Port Shepstone, Isipingo, Durban, Port St. Johns and East London (S. Afr. Mus.).

Distribution.—Red Sea.

Remarks.—Krauss' measurements and figure give a greater proportional length than is found in the South African Museum specimens.

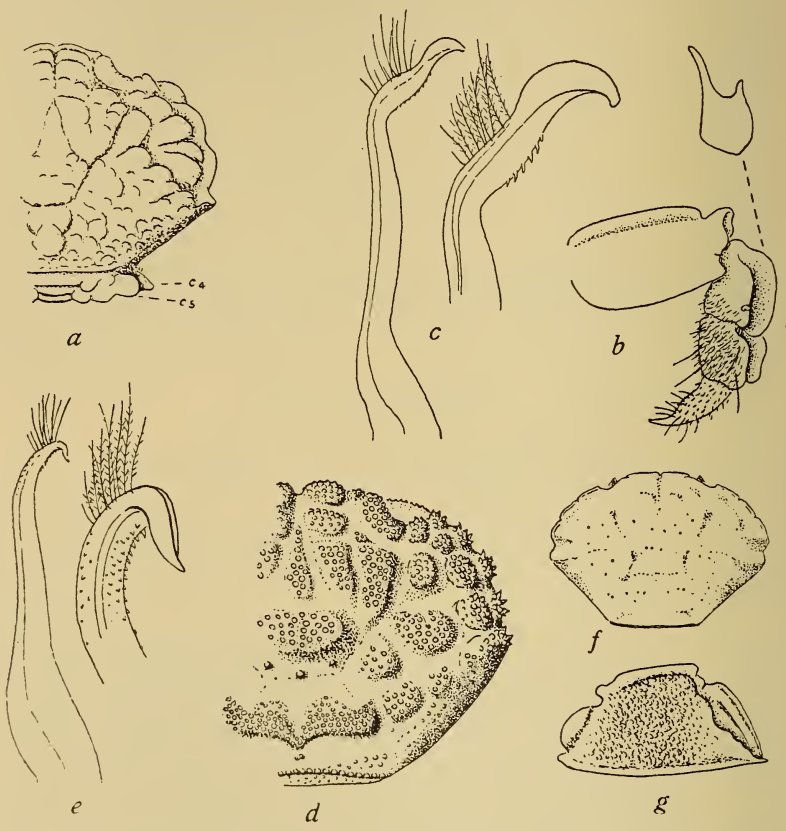


Fig. 39.—*Zosimus aeneus* (Linn.). *a*, carapace; c_4, c_5, coxal lobes of 4th and 5th legs.
Zozymodes xanthoides (Krss.). *b*, hind view of right 2nd leg with cross-section of 5th joint. *c*, 1st pleopod ♂.
Chlorodopsis areolata (M. Edw.). *d*, carapace. *e*, 1st pleopod ♂.
Lophozozymus dodone (Herbst). *f*, carapace. *g*, outer surface of chela.

Odhner makes no mention of the possible identity of Heller's and Krauss' species; but it is clear that Lenz's specimens should be identified with Krauss' species; and Balss quotes *xanthoides* from the Red Sea.

Gen. Chlorodiella Rathbun

1897. Rathbun, Proc. Biol. Soc. Wash., xi, p. 157.

1898. Alcock, *l. c.*, p. 159 (*Chlorodius*).

1925. Odhner, Medd. Göteb. Mus., xxxvii, p. 85 (*Chlorodius*).

1934. Gordon, Res. Sci. Ind. orient. Néerland, iii, fasc. 15, p. 49.

1938. Balss, *ibid.*, lxxv, p. 51.

Carapace depressed, flat, hexagonal, regions faintly or not at all demarcated, fronto-orbital width more than $\frac{3}{4}$ greatest width, front broad, $\frac{1}{3}$–$\frac{1}{2}$ greatest width (of carapace), straight with median notch, its lateral angles separated by grooves from supra-orbital margin; antero-lateral margin with 4 teeth or lobes, a little shorter than postero-lateral margin. Basal joint of ant. 2 extending into cleft between front and inner suborbital tooth, flagellum subequal to orbit. Chelipeds unequal, rather long, finger and thumb apically spooned. Legs not keeled. Abdomen ♂ with 3rd–5th segments fused.

Chlorodiella niger (Forskal)

1775. Forskal, Descr. Anim., p. 89.

1830. Rüppell, Beschr. 24 Krabben, p. 20, pl. 4, fig. 7, and pl. 6, fig. 14 (*Clorodius n.*).

1843. Krauss, Südafrik. Crust., p. 34, pl. 2, fig. 1, *a–c* (*Menippe martensii*).

1898. Alcock, *l. c.*, p. 160 (references).

1910. Stebbing, *l. c.*, p. 300 (*Pilodius martensii*).

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 447 (growth-changes).

1925. Odhner, *l. c.*, p. 85.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 135, pl. 71 (figure blurred and useless).

1937. Chopra and Das. Rec. Ind. Mus., xxxix, p. 402, fig. 8, and pl. 6, fig. 2.

1938. Balss, *l. c.*, p. 52.

1938. Gurney, Proc. Zool. Soc. Lond., ser. B, cviii, p. 75, pl. 1, figs. 1–4 (larval stage).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 156, fig. 38, D, E (plp. 1, 2 ♂).

Carapace with gastric region faintly subdivided into 3–5 areoles, surface non-granulate except near anterior borders, antero-lateral margin with 4 teeth, the 3rd the largest, the 1st very near outer orbital tooth. Wrist of cheliped with strong tooth on inner side, hand smooth or feebly granulate. Legs denticulate on anterior

margin, setose and with long bristles, dactyls spinulose on inner margin, and according to Krauss biunguiculate.

Length 15 mm., breadth 25 mm. Brownish yellow to dark violaceous, sometimes mottled, chelipeds and legs brown (Krauss: with reddish bands), finger and thumb of chelipeds black with white tips.

Locality.—Natal (Krauss).

Distribution.—Zanzibar, Seychelles, Red Sea, Indo-Pacific, Australia.

Gen. Chlorodopsis M. Edw.

1910. Stebbing, *l. c.*, p. 300.
1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 226.
1938. Balss, Medd. Göteb. Mus., lxxv, p. 58.

Differs from *Chlorodius*: carapace with well-defined regions and areoles, granular or hairy, or both; basal joint of ant. 2 extending up between front and suborbital tooth, its outer angle projecting into the orbit, from which the flagellum is thus excluded, at least in adult.

Chlorodopsis areolata (M. Edw.)

Fig. 39, *d*, *e*.

1838. McLeay, Annulosa S. Afr., p. 59 (*Chlorodius perlatus*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 790.
1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 354, pl. 47, fig. 8.
1910. Stebbing, *l. c.*, p. 300.
1918. *Id.*, Ann. Durban Mus., ii, p. 52 (*caelata*).
1942. Ward, Mauritius Inst. Bull., ii, p. 88 (*Actaea perlata*).
1942. *Id.*, *ibid.*, p. 97, pl. 6, fig. 3 (subsp. *brandonensis*).

Carapace flattish, length about $\frac{2}{3}$ width, areoles separated by broad shallow grooves, and covered with pearly granules, which on the lateral margins are more conical; covered with very short thick brownish fur; external frontal lobe distinct from supra-orbital ridge; 1 M separate, 2 M completely divided (the divisions subequal in width anteriorly but the inner division narrowing posteriorly more than the outer division), 3 M more or less tripartite, 4 M sometimes with very few granules, 1 P with the granules usually forming a transverse patch shaped like a cupid's bow, 2 P with a very regular transverse row of granules, with other granules in front and behind it. Chelipeds and legs granulate; wrist knobby; upper margins of 2nd–5th legs also

spinulose, dactyls bi-unguiculate but not strongly so. Sternum pitted, feebly granulate along edges of abdominal furrow in ♂.

Length 15 mm., breadth 22 mm. Brownish, granules pearly-white, finger and thumb of cheliped black, the black colour extending along underside and on inner and outer surfaces of hand.

Locality.—Durban, Port St. Johns (S. Afr. Mus.).

Distribution.—East coast of Africa, Mauritius, Indo-Pacific.

Remarks.—A photograph of McLeay's specimen of *C. perlatus* shows the hand as well as the wrist knobbly, also the area 4 M seems well developed (as in Lenz's figure) and confluent with 1 P. Ward places McLeay's species in the genus *Actaea*, close to *A. speciosa*, giving the differential character of the two species.

Stebbing, contrary to Alphonse Milne Edwards and Rathbun, kept *caelata* separate from *areolata*; but Miss Rathbun presumably based her opinion on an examination of Dana's type.

Gen. Phymodius M. Edw.

1852. Dana, U.S. Expl. Exp. Crust., p. 126 (*Cyclodius* ? = juv.).
1910. Stebbing, *l. c.*, p. 299.
1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 294.
1934. Gordon, Res. Sci. Ind. Or. Néerl., iii, fasc. 15, p. 32 (revision).
1938. Balss, Medd. Göteb. Mus., lxxv, p. 54.

Carapace transversely oval or hexagonal, but not very broad, regions and areoles well defined, smooth or finely granulose, fronto-orbital margin about half width of carapace, antero-lateral margin 4-lobed. Basal joint of ant. 2 between front and suborbital angle. Chelipeds stout, unequal (not greatly so), finger and thumb curved, tips spooned. Legs with upper margin of 4th–6th joints spinose, dactyl with strong apical tooth next to the unguis thus appearing bi-unguiculate. Abdomen ♂ with 5 segments.

Remarks.—Strictly speaking, if *Cyclodius* was based on juveniles of *Phymodius* as Balss considers it was, Dana's name should be employed in preference to the later one of Milne Edwards.

Key to the South African Species.

1. Sculpture of carapace sharper, front more arcuate (fig. 40, *i*). Chelipeds with more numerous tubercles as far as finger . *ungulatus.*
2. Sculpture more worn-looking, front less arcuate (fig. 40, *h*). Chelipeds with fewer tubercles, extending usually only half-way along hand . . . . . *monticulosus.*

Phymodius ungulatus (M. Edw.)

Fig. 40, *i*, *j*.

1843. Krauss, Südafrik. Crust., p. 29, pl. 1, fig. 2, *a–c* (*Xantho dehaanii*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 790.

1894. Ortmann, Semon's Austral. Reise, v, p. 51.

1910. Stebbing, *l. c.*, p. 299.

1934. Gordon, *l. c.*, p. 36, figs. 17, *b*, *b'*, 18, *b*, 19, *c*.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 140, pl. 73.

Carapace smooth, microscopically granulate, antero-lateral teeth sharply conical, areole 2 M longitudinally divided, 2 F oval and

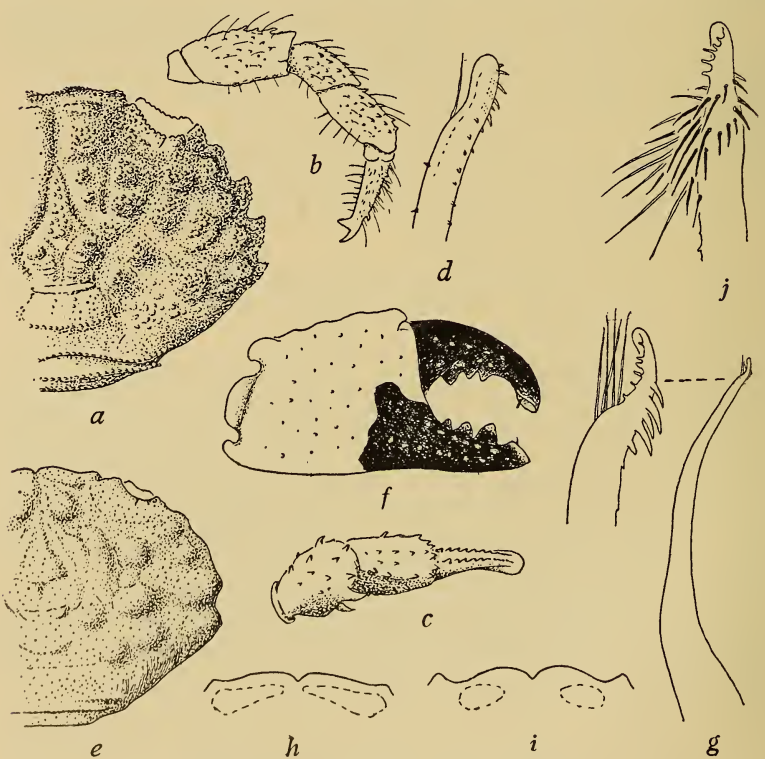


Fig. 40.—*Phymodius monticulosus* (Dana). *a*, carapace of juv. ♂ 7 × 10 mm. *b*, leg of juv. *c*, upper view of chela of juv. *d*, apex of 1st pleopod ♂ juv. *e*, carapace of a specimen 17 × 23 mm. *f*, chela. *g*, 1st pleopod ♂, with apex further enlarged. *h*, diagram of frontal area (after Gordon). *Phymodius ungulatus* (M. Edw.). *i*, diagram of frontal area (after Gordon). *j*, apex of 1st pleopod ♂ (after Gordon).

(In *a* the two rows of granules near hind margin are drawn rather too far apart.)

widely separated from its fellow, front with outer lobe well developed and deeply separated from the markedly convex median lobe, areoles 2 P reaching almost to median line. Penultimate abdominal segment ♂ with distal margin slightly less than proximal margin, ultimate segment very slightly longer than its basal width. Apex of 1st pleopod ♂ with long, backwardly directed spines.

Breadth 23 mm. (Gordon).

Locality.—Natal Point (=Durban) (Krauss).

Distribution.—Mauritius, east coast of Africa, Red Sea, Indo-Pacific.

Phymodius monticulosus (Dana)

Fig. 40, *a–h.*

1852. Dana, Proc. Ac. Nat. Sci. Philad., p. 79, and U.S. Expl. Exp. Crust., pt. 1, p. 206, pl. xi, fig. 9, *a–f* (*Chlorodius m.*).

1853. Jacquinot and Lucas, Voy. Pôle Sud. Astrolabe. zool., iii, p. 26, pl. 3, fig. 4 (*Chlorodius obscurus*).

1898. Alcock, *l. c.*, p. 163.

1934. Gordon, *l. c.*, p. 34, figs. 17, *a*, *a'*, 18, *a*, 19, *a*.

1947. Barnard, Ann. Mag. Hist. (xi), 13, p. 364.

Carapace as in *ungulatus* but more convex, though the areoles have a "worn" appearance, antero-lateral teeth blunter (at least in adult), 2 F transversely elongate and extending to median groove, frontal margin less convex, outer lobe less deeply separated from median lobe, areoles 2 P only present laterally. Dactyls of legs strongly bi-unguiculate. Penultimate segment of abdomen ♂ with distal margin slightly greater than proximal margin, ultimate segment slightly shorter than its basal width. Apex of 1st pleopod ♂ with forwardly directed setae.

Breadth 33 mm. (Gordon). Brown or chestnut-brown, finger and thumb of cheliped black, the colour extending on to palm.

Locality.—Delagoa Bay (coll. van der Horst, and Lourenzo Marques Mus.).

Distribution—Mauritius, Madagascar, Indo-Pacific.

Remarks.—Young specimens have a strongly nodular carapace, granulate all over, and sharper antero-lateral teeth (fig. 40, *a*). The denticles and granules on the chelipeds are also much sharper (fig. 40, *c*).

Gen. Lophozozymus M. Edw.

1863. Milne Edwards, Ann. Sci. Nat. (4), xx, p. 276.
1898. Alcock, *l. c.*, p. 106 (as subgen. of *Zozymus*).
1925. Odhner, *l. c.*, p. 82.

Like *Zosimus*, but tips of finger and thumb of cheliped acute, not hollowed; antero-lateral margin very sharp; basal joint of ant. 2 touching side-edge of front.

Lophozozymus dodone (Herbst)

Fig. 39, *f*, *g*.

1865. Heller, "Novara" Crust., p. 7, pl. 1, fig. 3 (*Atergatis elegans*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 789.
1884. Miers, Zool. H.M.S. *Alert*, p. 527.
1894. Ortmann, Semon's Austral. Resie, v, p. 50.
1898. Alcock, *l. c.*, p. 108 (references).
1925. Odhner, *l. c.*, p. 82.

Carapace very smooth, glabrous, with scattered pits, regions only faintly indicated, and with no subdivision into areoles; antero-lateral margin trenchant, somewhat wavy, shallowly 4-lobate, the first lobe confluent with orbit, front with very feeble median notch; infra-orbital tooth prominent. Cheliped, outer surface of wrist and hand granulose-rugulose, upper margin of 4th joint and inner margin of wrist cristate, upper and lower margins of hand both sharply keeled, the lower continued on to thumb, upper margin of finger also keeled. Legs smooth, upper margins of 4th–6th joints, and lower margin also of 4th, cristate, lower margin of 6th and both outer and inner surfaces of dactyls shortly pilose.

Length (♀) 14 mm., breadth 21 mm. Carapace brownish, mottled, stone-grey towards antero-lateral margins, wrist and hand of cheliped pale buff with pink mottling, finger and thumb black, legs reddish.

Localities.—Mozambique (Miers); Port Elizabeth (Ortmann); Port St. Johns (S. Afr. Mus.); off Port Shepstone, Natal, 24 fathoms (S. Afr. Mus.); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Mauritius, east coast of Africa, Indo-Pacific.

Gen. Medaeus Dana

1898. Alcock, *l. c.*, p. 123.
1925. Odhner, *l. c.*, p. 81.
1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 273.
1935. Balss, Rec. Ind. Mus., xxxvii, pp. 45, 46.

Differs from *Xantho* (*infra*) in having the antero-lateral margins continued (Alcock says "very distinctly") beneath the orbits to the buccal cavity.

Remarks.—In the following species the sternum is broader than in the South African species of *Xantho*, and the sternal plates between the 4th legs project backwards beyond the lateral projections of the 3rd abdominal segment in ♂ (*cf.* fig. 42, *a*, *c*, *f*).

Medaeus granulosus (Haswell)

Figs. 41, *a*, 42, *a*, *b*.

1882. Haswell, Cat. Austral. Crust., p. 61 (*Leptodius g.*).

1884. Miers, Zool. H.M.S. *Alert* Crust., p. 211, pl. 20, figs. C, *c* (*Xantho macgillivrayi*).

1918. Stebbing, Ann. Durban Mus., ii, p. 51 (*Xantho distinguendus*, non de Haan).

1925. Odhner, *l. c.*, p. 81.

1931. Gordon, J. Linn. Soc. Lond., xxxvii, p. 543, figs. 19, 22, A.

1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 127, fig. 17, A (plp. 1 ♂).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 148, fig. 37, A, B (plp. 1, 2 ♂).

Carapace length $\frac{2}{3}$ breadth, regions very well marked, numerous short transverse rows of bead-like granules on anterior half, granules more scattered on hinder part, granules distinct on hind margin and between the 4 antero-lateral acute teeth; pterygostomial region granulate and sparsely setose. Chelipeds unequal, wrist and upper surface of hand foveolate, and with raised patches and rows of granules, inner surface of hand smooth; tips of finger and thumb pointed. Legs sparsely setose, upper margin of 4th joint keeled (but not sharply), 5th and 6th joints with raised granulate ridges separated by grooves. Abdomen and 1st pleopod ♂ (see fig. 42, *a*, *b*); 1st and 2nd abdominal segments and lateral corners of 3rd granulate; width of sternum ♂ between insertion of 2nd legs $1\frac{3}{4}$ in length (to bases of 4th legs).

Length up to 16 mm., breadth 24 mm. Brownish, finger and thumb of cheliped blackish, the colour not extending on to hand.

Localities.—Durban (Stebbing, and S. Afr. Mus.); Algoa Bay (Port Elizabeth Mus.).

Distribution.—Australia, Japan.

Remarks.—If this species be placed in *Xantho*, Miers' name *macgillivrayi* must be used, as *granulosus* is preoccupied by Rüppell. The

antero-lateral margins are, however, continued below the orbit to the buccal cavity, albeit inconspicuously so, and the species can thus be placed in *Medaeus*, following Odhner and Gordon.

Gordon has given a tabular conspectus of the differences between this species and *Xantho exaratus* (=*hydrophilus*) and the true *distinguendus* de Haan.

Thanks to Gordon, who figured the 1st pleopod ♂, the identity of the South African specimens with Miers' specimens seems to be certain.

Gen. Xantho Leach

1910. Stebbing, *l. c.*, p. 297.

1925. Odhner, *l. c.*, p. 79.

Carapace broad, moderately convex anteriorly, flat posteriorly, regions and areoles usually well defined, antero-lateral margin lobed or dentate, postero-lateral margin not concave, fronto-orbital width not more than half width of carapace. Inner suborbital angle of orbit usually prominently dentiform. Basal joint of ant. 2 meeting front, flagellum as long as orbit. Chelipeds usually unequal, tips of finger and thumb pointed (*Xantho* sensu stricto) or spooned (*Leptodius*). Abdomen ♂ with 3rd–5th segments fused (but the sutures may be distinct). 2nd pleopod ♂ very short.

Remarks.—Several of the species, and varieties, are very much alike, and an examination of the 1st pleopods ♂ is essential.

Key to the South African Species.

1. Finger and thumb of chelipeds pointed (*Xantho*). Chelipeds equal in both sexes. Carapace much pitted, antero-lateral lobes blunt . . . . . *impressus.*
2. Finger and thumb spooned. Chelipeds unequal in both sexes (*Leptodius*).
   - *a.* Four antero-lateral teeth.
     - i. Carapace in hinder third almost smooth . . *hydrophilus.*
     - ii. Carapace more or less granulate, and the areoles 2 R, 3 R, 1 P, 2 P more or less distinct . cf. *voeltzkowii.*
   - *b.* Five antero-lateral teeth . . . . . { *quinquedentatus.* [*sanguineus* Mauritius].

Xantho (*Xantho*) *impressus* (Lam.)

Figs. 41, *e–h*, 42, *i–k*.

1873. Milne Edwards, Nouv. Arch. Mus. Paris, ix, p. 198, pl. 6, fig. 2.

1921. Stebbing, Ann. Durban Mus., iii, p. 13, pl. 1.

1942. Ward, Mauritius Inst. Bull., ii, p. 91 (*Neoxanthias i.*).

Adult (fig. 41, *f*) Carapace very short and broad, much pitted, gastric and cardiac regions separated by very broad and deep furrows

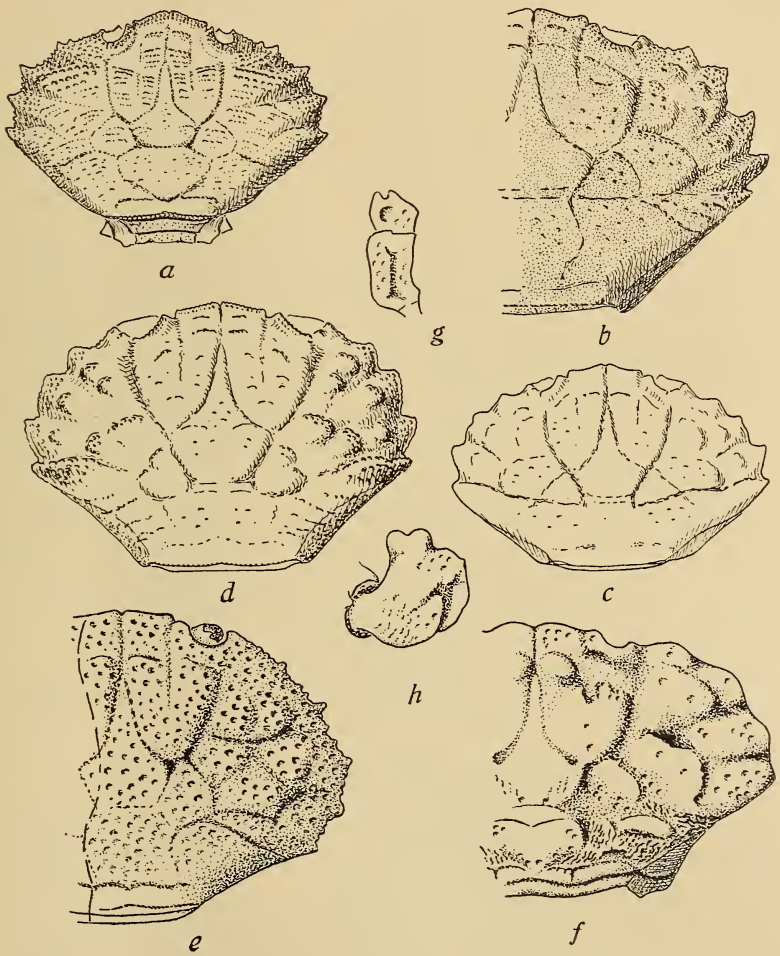


FIG. 41.—*Medaeus granulosus* (Hasw.). *a*, carapace.
Xantho quinquedentatus Krauss. *b*, carapace.
Xantho hydrophilus (Herbst). *c*, carapace.
Xantho, cf. *voeltzkowii* Lenz. *d*, carapace.
Xantho impressus (Lam.). *e*, carapace of ♂ 12 × 18 mm. The broken line marks the left side of a median pale band. *f*, carapace of large ♀ 37 × 65 mm. *g*, outer view of 3rd and 4th joints mxp. 3 of large ♀. *h*, upper view of right wrist of large ♀.

from the lateral portions, which are broadly undulate with shallow grooves; antero-lateral margin with 4 thickened and blunt lobes, the 1st below level of orbit. Chelipeds equal in both sexes, upper surface of hand with incomplete longitudinal pitted furrow. Sutures of abdominal segments 3–5 ♂ persistent. Sternum more conspicuously pitted than carapace.

Juv. (Natal) (fig. 41, *e*). Carapace closely and rather coarsely shagreened (almost granulate) all over, in addition numerous pits which become shallower and less conspicuous posteriorly, pitting continued below outer angle of orbit; grooves between M and L deep, most of the other grooves distinct, cardiac region the least well defined; antero-lateral margin with 5 rather conspicuous denticles with intervening smaller denticles. Chelipeds subequal, upper surface of wrist and hand with a corroded appearance due to shallow depressions, on the hand in about 5 longitudinal series, tips of finger and thumb *narrowly* spooned. Upper margin of 4th joints of legs serrulate, with plumose setae; lower margin of 6th joint granulate, setose, dactyl granulate, causing margins to appear finely denticulate, inner margin setose. Sutures of abdominal segments 3–5 more or less persistent. Sternum and abdomen shagreened, but very inconspicuously pitted.

Length up to 37 mm., breadth 65 mm. Adult waxy white, finger and thumb of cheliped blackish brown, ungues of legs horny. Juv. reddish, with a broad median longitudinal creamy band from front to hind margin (fig. 41, *e*), ventral surface pale, with red spots.

Localities.—Umkomaas (Stebbing); Umtwalumi, Natal (coll. T. A. Stephenson, 1 juv.); Delagoa Bay (Lourenzo Marques Mus. ad. ♀).

Distribution.—Mauritius, Andaman Is., Mergui Archipelago.

Remarks.—A ♀ presumably from Delagoa Bay (L.M. Mus.) and a ♀ from Mauritius (S. Afr. Mus.) agree with Alcock's most excellent description. Stebbing's figure of a specimen 16 × 27 mm. is recognizable but does not do justice to the animal.

The 12 × 18 mm. specimen from Umtwalumi is a ♂, and though at first sight it looks very different, it has certain features which point to its being really this species. Whether the differences are sexual or merely due to differences in age remains to be determined on more abundant material.

This species was made the type of *Neoxanthias* by Ward (1932, Austral. Zoologist., vii, p. 249).

Xantho (*Leptodius*) *hydrophilus* (Herbst)

Figs. 41, *c*, 42, *c–e*.

1843. Krauss, Südafrik. Crust., p. 30 (*affinis*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 790 (*exaratus*).

1884. Miers, Crust. H.M.S. *Alert*, pp. 214, 530 (*exaratus* and var. *gracilis*).

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 7 (synonymy).

1910. *Id.*, *l. c.*, p. 297.

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 444, pl. 43, fig. 1 (leg).

1917. Stebbing, Ann. Durban Mus., ii, p. 8.

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 60.

1925. Odhner, *l. c.*, p. 80.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

1931. Gordon, J. Linn. Soc. Lond., xxxvii, p. 544, figs. 20, 22, B (*exaratus*).

1932. Shen, Zool. Sinica, ix, figs. 57, 58, *c*, *d* (*exaratus*) (sine descr.).

1934. Gordon, Rec. Sci. Ind.Orient. Néerl., iii, fasc. 15, p. 29, fig. 16, *a–c* (1st plp. ♂) (*exaratus* var.).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 110, pl. 58 (*exaratus*).

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 398 (*exaratus*).

1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 125, fig. 17, B (plp. 1 ♂) (*exaratus*).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 149, fig. 37, C (plp. 1 ♂) (*exaratus*).

Carapace length about ¾ breadth, regions and areoles distinct in anterior two-thirds, smooth and flat in hinder third, shagreened, tiny granules distinct only on anterior margins of front, supra-orbital ridge, and areoles 2 M and 1–5 L; antero-lateral margin with 4 fairly sharp teeth (in addition to outer orbital angle), pterygostomial region densely pilose. Chelipeds unequal, upper and lower margins of 4th joint densely setose, wrist and hand minutely and closely granulate or shagreened, upper and outer surfaces usually with some ill-defined wrinkles or rugosities, finger and thumb spooned. Legs, upper margin of 4th joint not keeled, densely fringed with somewhat shaggy hair, 5th and 6th joints smooth, feebly granulate and setose. Abdomen ♂ 1st–3rd segments feebly granulate on lateral parts only, 6th segment as long as broad (or a trifle longer), 7th bluntly rounded. Width of sternum between bases of 2nd legs (*i.e.* 1st walking legs) 1½ in length (to insertion of 4th legs).

Length up to 22 mm., breadth 30 mm. Whitish or yellowish or

brownish, sometimes mottled, or with a red blotch on gastric region, or with violet bands and loops, chelipeds violaceous, finger and thumb blackish, the colour not extending on to hand.

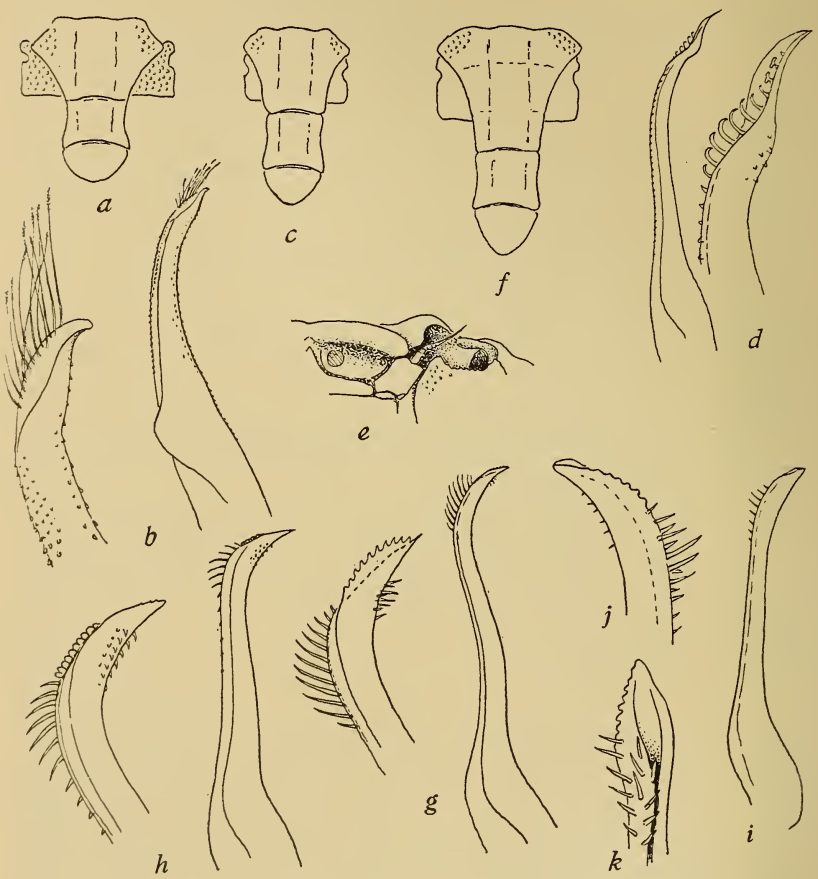


Fig. 42.—*Medaeus granulosus* (Hasw.). *a*, 3rd–7th abdominal segments and sternal plates between 4th legs ♂. *b*, 1st pleopod ♂, with apex further enlarged. *Xantho hydrophilus* (Herbst). *c*, abdomen ♂. *d*, 1st pleopod ♂, with apex further enlarged. *e*, ventral view of front, 1st antenna removed. *Xantho quinquedentatus* Krss. *f*, abdomen ♂. *g*, 1st pleopod ♂, with apex further enlarged. *Xantho*, cf. *voeltzkowii* Lenz. *h*, 1st pleopod ♂, with apex further enlarged. *Xantho impressus* (Lam.). *i*, *j*, *k*, ventral, dorsal and inner (median) views respectively of 1st pleopod ♂ (12 × 18 mm.).

Localities.—Durban (Krauss, Stebbing); Mozambique (Hilgendorf, Miers: var. *gracilis*); Delagoa Bay (coll. K. H. B., and Lourenzo Marques Mus.).

Distribution.—Mauritius, east coast of Africa, Indo-Pacific. Also N. Atlantic, Mediterranean, Canary Is., Angola.

Remarks.—Stimpson (1907, Smiths. Misc. Coll., xlix, pp. 52 *sqq.*, pl. 6, figs. 3, 4, 6–9) discusses this species and several varieties, some of which have a "supplementary tooth" on the antero-lateral margin, making 5 in all (as in *quinquedentatus*). At that time the importance of the 1st pleopod ♂ as a specific character was not realized, so that it is not only impossible to recognize any of his varieties from the descriptions, but it is also quite probable that several distinct species are confused.

At first glance somewhat like *Etisus laevimanus* (*q.v.*).

The name *hydrophilus* seems to be employed for the Atlantic form (as in Balss, 1921) and *exaratus* for the Indo-Pacific form (*auctores*).

Xantho (*Leptodius*) *quinquedentatus* Krauss

Figs. 41 *b*, 42, *f*, *g*.

1843. Krauss, Südafrik. Crust., p. 30, pl. 1, fig. 3, *a–d*.

1910. Stebbing, *l. c.*, p. 298.

1917. *Id.*, Ann. Durban Mus., ii, p. 8.

1918. *Id.*, *ibid.*, ii, p. 51.

1925. Odhner, *l. c.*, p. 80.

1943. Buitendijk, C.R. Soc. Néerland, Zool. Séance, 17th October 1942, p. 289.

Carapace length about $\frac{2}{3}$ breadth, regions and areoles distinct in anterior two-thirds, but indistinct in hinder third, shagreened or closely and minutely granulate, granules more distinct on the tops and anterior margins of the areoles and on the frontal and antero-lateral margins, also some scattered pits; antero-lateral margin with 5 teeth (in addition to outer orbital angle), the 1st rather blunt, the others dentiform, 5th smaller than 4th, pterygostomial region granulate and setose. Chelipeds unequal, upper and lower margins of 4th joint setose, wrist and hand closely and minutely granulate with some irregular wrinkles and rugosities on upper and outer surfaces, finger and thumb spooned. Legs, upper margin of 4th joints granulate (almost denticulate in large specimens) and fringed with setae, upper surfaces of 5th–7th joints strongly granulate, the granules on 7th (dactyl) conical. Abdomen ♂ 1st–3rd segments granulate only on lateral parts (in large specimens 1st segment may be entirely granulate) 6th segment as long as wide. Anterior margin of 4th joint of mxp. 3 notched (slightly so in young specimens).

Length up to 20 mm., breadth 33 mm. Yellowish, reddish, or brownish, uniform or mottled, finger and thumb of cheliped blackish, the colour extending along lower surface of hand.

Localities.—Durban (Krauss, Stebbing); Port Edward, Natal (coll. T. A. Stephenson); Port St. Johns (S. Afr. Mus.).

Distribution.—Mauritius (S. Afr. Mus.).

Remarks.—Compare *hydrophilus*. The Mauritius specimens agree with those from Natal, but having been stuffed (ex-coll. Robillard) the 1st pleopod ♂ is not available as a check.

Alcock and Stebbing have mentioned that Krauss described his species as having the finger and thumb of cheliped pointed. It is evident that Krauss made a slip. *X. euglyptus* Alck. is probably synonymous (see Odhner, 1925), but the 1st pleopod ♂ should be examined. Both may possibly be synonymous with *sanguineus* M. Edw., which has been recorded from Mauritius.

Xantho (*Leptodius*); cf. *voeltzkowii* Lenz

Figs. 41, *d*, 42, *h*.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 353, pl. 47, figs. 6, 6, *a* (chela).

1925. Odhner, *l. c.*, p. 80.

1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 125, figs. 16 (whole animal), 17, C–E (plp. 1 ♂).

Carapace length about $\frac{2}{3}$ breadth, regions and areoles distinct, including 2 R and 3 R, and 1 P and 2 P, shagreened and granulate, the granules larger and more distinct near the frontal and antero-lateral margins and the anterior margins of the areoles; antero-lateral margin with 4 teeth, the 4th rather smaller than 2nd and 3rd, pterygostomial region granulate and pilose. Chelipeds unequal, upper and lower margin of 4th joint fringed, wrist and hand closely granulate and with blunt tubercles or knobs, those on upper margin of hand forming more or less 2 parallel rows, one or two lines of larger granules on outer surface of hand, tips of finger and thumb spooned. Legs, upper margin of 4th–6th joints finely granulate, fringed with setae, a rather conspicuous ridge along hinder surface of 5th joint. Abdomen ♂ segments 1–3 feebly granulate in lateral parts only. Pleopod 1 ♂ (see fig. 42, *h*).

Length 8·5 mm., breadth 13 mm.

Localities.—Durban, Delagoa Bay, and Mozambique Island (coll. K. H. B.).

Remarks.—Two juveniles (3 and 2 mm. in length) were submitted to Odhner and identified by him as possibly *voeltzkowii* Lenz. Lenz distinguished his Zanzibar species from *edwardsii* (Heller) by the 2 rows of knobs on hand of cheliped, and both species from *sanguineus* (M. Edw.) by having only 4 antero-lateral teeth instead of 5. Alcock makes *edwardsii* a synonym of *sanguineus*.

Until the 1st pleopod ♂ of the species of *Xantho* have been described it is impossible to assign the present specimens to any species; but the 1st pleopod corresponds closely with Monod's figure.

Gen. Actaea de Haan

1851. Dana, Amer. J. Sci. (2), xii, p. 126 (*Actaeodes*).
1869. Milne Edwards, Ann. Soc. entom. Fr. (4), ix, p. 168 (*Banareia*).
1879. *Id.*, Crust. Reg. Mexique, p. 253 (*Glyptoxanthus*).
1894. Ortmann, Semon's Austral. Reise, v, p. 53 (*Cycloblepas*).
1898. Alcock, *l. c.*, p. 137.
1905. Stebbing, Mar. Invest. S. Afr., iv, p. 29 (references).
1910. *Id.*, *l. c.*, p. 298.
1925. Odhner, *l. c.*, p. 35.
1930. Rathbun, *l. c.*, pp. 250 and 263 (*Glyptoxanthus*).

Carapace convex, transversely oval, regions and areoles well marked, usually convex and granulate, antero-lateral margin usually shallowly 4-lobate, postero-lateral margin usually concave, front deflexed, usually bilobed with distinct median notch. Basal joint of ant. 2 usually stopping at the deflexed lateral margin of front, sometimes projecting into gap between front and inner suborbital angle, flagellum subequal to orbit. Chelipeds equal in both sexes, tips of finger and thumb usually pointed, though sometimes blunt (spooned in *tomentosa*). Abdomen ♂ with 3rd–5th segments fused. Pleopod 2 ♂ short.

Remarks.—A large genus of small crabs, which are mostly difficult to separate specifically.

For *A. angolensis* Br. Cap. 1866, see Monod, Bull. Com. Étud. sci. Afr. occif. Fr., xv, 1933, p. 70.

Key to the South African [Mauritian] Species.

I. Carapace length ¾ breadth, flattened, especially posteriorly, anteriorly setose. Areole 2 M incompletely divided (fig. 43, *a*) . . . . . *depressa.*

II. Carapace convex, length less than ¾ breadth (usually about ⅔), but antero-lateral margin always longer than postero-lateral margin.

A. Legs with 5th and 6th joints dorsally bicarinate, with an intervening groove or a series of cup-like hollows — *cavipes.*

B. Legs not bicarinate.

1. Carapace and legs with conical tubercles, sometimes spiniform.

a. Carapace with simple (mostly) isolated tubercles . . . . . [*nodulosa*].

b. Carapace and legs with compound, closely-set tubercles, like a raspberry (fig. 43, *b*), nearly obliterating the ordinary areolation . . . . . *savignyi.*

2. Carapace, and legs when granulate, with miliary or bead-like, or vesiculous granules of nearly uniform size (fig. 43, *e*).

a. Unguis on dactyl of 2nd (1st walking) leg concealed in a brush of golden hairs (fig. 43, *d*) . . . . . *speciosa.*

b. Unguis on dactyl of 2nd leg not concealed.

i. Carapace length $\frac{2}{3}$ (or less) breadth. Areole 3 M tripartite.

α. Carapace and legs with short black felt. Finger and thumb of chelipeds spooned *tomentosa.*

β. Carapace and legs with short black bristles . . . *hirsutissima.*

ii. Carapace length more than $\frac{2}{3}$ breadth.

α. Finger and thumb of cheliped compressed, scissor-like (fig. 43, *g*) . . . . *parvula.*

β. Finger and thumb normal.

* Areoles feebly developed posteriorly . . *variolosa.*

** Areoles more or less well developed.

† Areole 2 M incompletely divided (*cf.* fig. 43, *a*).

§ 4–6 L separated [*pulchella*].

§§ 4–6 L not separated . [*helleri*].

†† Arcole 2 M completely divided (*cf.* fig. 43, *i*).

§ 3 M undivided . *rüppellii.*

§§ 3 M tripartite . [*rufopunctata*].

[*Note on Mauritian Species.—A. nodulosa* and *pulchella* are figured (carapace) in Odhner, 1925. Pleopod 1 ♂ of Mauritian specimen of *rufopunctata* is similar to that of *savignyi* (fig. 43, *c*).]

Actaea depressa (White)

Fig. 43, *a*.

1843. Krauss, Südafrik. Crust., p. 33, pl. 1, fig. 7, *a–d* (*Pilumnus granulatus*).

1847. White, Proc. Zool. Soc. Lond., xv, p. 225 (*Xantho d.*).

1887. de Man, J. Linn Soc. Lond., xxii, p. 27 (*parvula*, non de Haan, Krauss).

1898. Alcock, *l. c.*, p. 146 (*parvula*, non de Haan, Krauss).

1925. Odhner, *l. c.*, p. 38, pl. 2, fig. 19.

Carapace length $\frac{3}{4}$ breadth, flattened, especially posteriorly, regions and areoles in low relief anteriorly, indistinct posteriorly, only the bristly or setose front and antero-lateral margins being somewhat deflexed, granulate, the granules on the edge of front and antero-lateral margin somewhat conical, especially on the lobes E, N, T, S (see fig. 37, *a*); 1 M not separate, 2 M incompletely divided; postero-lateral margin straight, the sides steep. Chelipeds equal, hand covered with short thick pile, with some longer hairs, with lines of granules which dorsally become conical or spiniform. Legs moderately setose, with conical granules on upper margins. Pleopod 1 ♂ similar to that of *savignyi* (fig. 43, *c*).

Length 30 mm., breadth 45 mm. Violaceous or yellowish, orange or reddish, mottled and speckled with white on carapace, chelipeds and legs, finger and thumb of cheliped brown in ♀, black in ♂, the colour extending on to palm, hairs yellowish.

Localities.—Durban (Krauss); Durban and Isipingo (S. Afr. Mus.); Impengazi, north of St. Lucia Bay (coll. T. A. Stephenson).

Distribution.—Andaman Is., Mergui Archipelago, Philippine Is., Bonin Is.

Remarks.—Although Krauss' name is earlier, the combination *Actaea granulata* is preoccupied (Audouin = *savignyi* M. Edw. *v. infra*), hence White's name is adopted (Odhner, 1925).

This species is distinguished from others by the greater length compared with its breadth, and the markedly flattened hinder part of the carapace. The latter feature renders it liable to be confused with *Pilumnus longicornis* (*q.v.*, p. 265).

Actaea cavipes (Dana)

1852. Dana, U.S. Expl. Exp., xiii, Crust., p. 199, pl. xi, fig. 5, *a*, *b* (*cellulosa*).

1859. Girard, Ann. Soc. entom. Fr. (3), vii, p. 149, pl. 4, figs. 2–2, *b* (*Cancer fossulatus*).

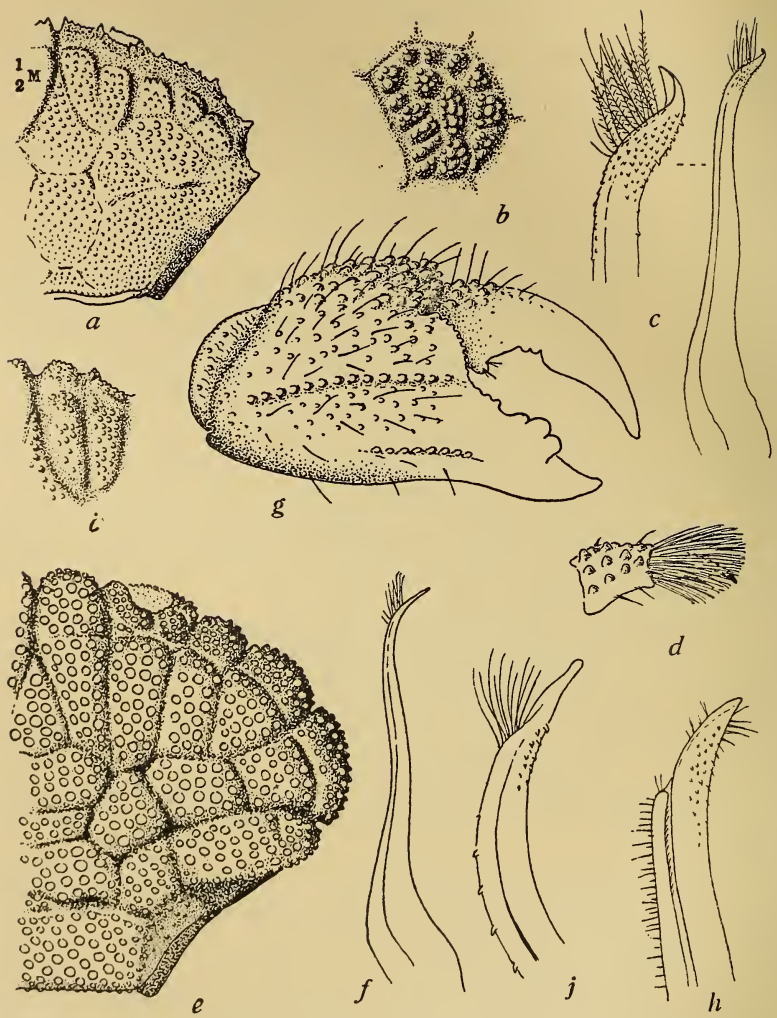


FIG. 43.—*Actaea depressa* (White). *a*, carapace (1 M not separate, 2 M incompletely divided).
Actaea savignyi (M. Edw.). *b*, areole 5 L to show compound tubercles. *c*, 1st pleopod ♂, with apex further enlarged.
Actaea speciosa (Dana). *d*, dactyl of 2nd leg.
Actaea tomentosa (M. Edw.). *e*, carapace, denuded. *f*, 1st pleopod ♂.
Actaea parvula (Krauss). *g*, chela. *h*, apex of 1st pleopod ♂.
Actaea rüppellii (Krauss). *i*, areole 2 M (completely divided) and frontal region. *j*, apex of 1st pleopod ♂.

1877. Kossmann, Reise Roth. Meer. Crust., p. 27, pl. 1, fig. 3 (*Psaumis f*).

1894. Ortmann, Semon's Austral. Reise, v, p. 50.

1898. Alcock, *l. c.*, pp. 147 and 148 (*fossulata*).

1907. Rathbun, Mem. Mus. Comp. Zool. Harv., xxxv, p. 44, pl. 1, fig. 2.

1913. Klunzinger, Nova Acta Leop. Carol. Ak., xcix, p. 190, pl. 6, fig. 7.

1914. Rathbun, Proc. Zool. Soc. Lond., ii, p. 658, pl. 1, fig. 6, pl. 2, fig. 7 (*Glyptoxanthus cymbifer*).

1924. Balss, Denksch. Ak. Wiss. Wien, xcix ("Pola" Exp.), p. 8 (*fossulata*).

1925. Odhner, *l. c.*, p. 68.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 128, pl. 68.

Carapace length $\frac{3}{5}$ breadth, completely areolated and covered with miliary granules, areoles separated by broad but shallow grooves, 2 M more or less completely divided; postero-lateral margin very short, concave, antero-lateral margin 4–5-lobed, lobes variable in size and prominence; carapace often with an eroded or worm-eaten appearance, likewise the wrist and hand of cheliped. Legs with 5th and 6th joints dorsally bicarinate, the crests enclosing a trough or groove which is sometimes (*fossulata*) divided up into cup-like hollows.

Length 12·5 mm., breadth 20 mm.

Locality.—Europa Is., Mozambique Channel (Lenz).

Distribution.—Mauritius, Red Sea, east coast of Africa, Indo-Pacific.

Remarks.—Ward (1942, Mauritius Inst. Bull., ii, p. 87) finds small differences between specimens from Australasia and from Chagos Archipelago, and uses the name *fossulata* for the latter.

Actaea savignyi (M. Edw.)

Fig. 43, *b*, *c*.

1826. Audouin, Expl. Planches Savigny Crust. Egypt, pl. 6, fig. 2 (*Cancer granulatus*, non Linn.).

1833. de Haan, Crust. Jap., decas prima, p. 18, decas secunda (1835), p. 47 (*Cancer* (*Actaea*) *g.*).

1834. Milne Edwards, Hist. Nat. Crust., i, p. 378.

1851. Bianconi, Spec. Zool. Mosambic, fasc. 5, p. 82 (*Cancer s.*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 787.

1910. Stebbing, *l. c.*, p. 299 (*granulata*).

1922. Balss, Arch. Naturg., p. 122.

1924. *Id.*, Denksch. Ak. Wiss. Wien, xcix ("Pola" Exp.), p. 8.

1925. Odhner, *l. c.*, p. 52.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 151, fig. 38, C (plp. 1 ♂).

Carapace length $\frac{4}{5}$–$\frac{3}{4}$ breadth, but the strongly concave postero-lateral margin shorter than antero-lateral, whole surface covered with close-set tubercles (like a raspberry) so as to obscure the ordinary areolation, each tubercle itself composed of a number of small granules or tubercles, tubercles more conical, even spiniform, in juv. than in adult; front distinctly bilobed. Chelipeds and legs with similar compound tubercles, upper margins of 4th–6th joints of legs cristate. Sternum and abdomen granulate. Basal joint of ant. 2 reaching as far as (or almost) inner suborbital angle.

Length 20 mm., breadth 26 mm. As preserved pinkish white, with darker patches on gastric, branchial, and orbital regions, finger and thumb of cheliped dark brown. Alcock says: uniform purplish black.

Localities.—Off Umhloti River, 25 fathoms (Stebbing); off Umtwalumi River, 25 fathoms (S. Afr. Mus.); Delagoa Bay (Barnard); Mozambique (Bianconi, Odhner).

Distribution.—East coast of Africa, Red Sea, Indo-Pacific to China, Japan, Australia.

Remarks.—Among the South African species this one is very readily distinguished by the compound tubercles. There is a superficial resemblance to *Dairodes margaritatus* (*infra*, p. 258, fig. 47, *g*), which, however, has fissures on the carapace and a rostriform front.

Actaea speciosa (Dana)

Fig. 43, *d*.

1852. Dana, U.S. Expl. Ex., xiii. Crust., p. 198, pl. xi, fig. 4, *a–c*.

1861. Heller, Abh. zool. bot. Ges. Wien, xi, p. 9, and SB. Ak. Wien, xliii, p. 329, pl. 2, fig. 19 (*Actaeodes nodipes*).

1865. Milne Edwards, Nouv. Arch. Mus., i, p. 274.

1877. Kossmann, Reise Roth. Meer. Crust., p. 27, pl. 1, fig. 4 (*Psaumis glabra*).

1898. Alcock, *l. c.*, p. 143.

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 254, fig. 42, *c* (dactyl 2nd leg).

1913. Klunzinger, Nov. Act. Leop. Carol. Ak., xcix, p. 181 (p. 179, pl. 1, fig. 3, pl. 6, fig. 3; *fide* Balss, 1924).

1925. Odhner, *l. c.*, p. 62.

Carapace length $\frac{3}{4}$ breadth, apparently glabrous but covered with a very fine and short felt, completely areolated and covered with bead-like or vesicular granules of nearly uniform size, 1 M separated (rather indistinctly so), 2 M incompletely divided, 3 M tripartite, antero-lateral margin shallowly lobate, longer than the concave postero-lateral margin. Chelipeds and legs knobbly and granulate. Unguis on dactyl of 2nd (1st walking) leg concealed in a brush of stiff golden hairs (both sexes). Basal joint of ant. 2 entering gap between front and inner suborbital angle, though the latter nearly meets the front, flagellum shorter than orbit, which is subcircular. Abdominal segments 1–3 in ♂ granulate.

Length 9 mm., breadth 12 mm. Brown, some of the areoles on anterior part of carapace, and some of the knobs on chelipeds reddish.

Localities.—Durban (Odhner); Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius, Red Sea, Indo-Pacific.

Remarks.—The "cleansing claw" is characteristic of this species. What special use it may have, however, has not been observed.

Actaea tomentosa (M. Edw.)

Fig. 43, *e*, *f*.

1834. Milne Edwards, Hist. Nat. Crust., i, p. 385 (*Zozymus t.*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 788.

1898. Alcock, *l. c.*, p. 140 (references).

1925. Odhner, *l. c.*, p. 70.

Carapace length less than $\frac{2}{3}$ breadth, covered, as are the exposed portions of chelipeds and legs, with a short dense blackish felt, more or less completely concealing the large vesicular granules but not the areolation; antero-lateral margin (when denuded) shows 4 deep narrow notches which are continued as grooves on the pterygostomial region; postero-lateral margin short and very concave. Ventral surface granulate and covered with felt. Chelipeds not knobbly, tips of finger and thumb spooned. Legs granulate and tuberculate, fringed with shaggy hair.

Length 19 mm., breadth 31 mm. Blackish; when denuded the carapace is marbled with red and whitish; finger and thumb dark, the dark colour extending on to inner and lower surface of palm.

Localities.—Mozambique (Hilgendorf); Europa Is., Mozambique Channel (Lenz); Durban (Odhner, and S. Afr. Mus.).

Distribution.—Mauritius, east coast of Africa, Red Sea, Indo-Pacific.

Actaea hirsutissima (Rüpp.)

1830. Rüppell, Beschr. 24 Krabben, p. 26, pl. 5, fig. 6, pl. 6, fig. 21 (*Xantho h.*).

1898. Alcock, *l. c.*, p. 141 (references).

1904. Doflein, D. Tiefsee Exp., vi, p. 102, pl. 32, figs. 1, 2.

1921. Stebbing, Ann. S. Afr. Mus., xviii, p. 455.

1925. Odhner, *l. c.*, p. 69, pl. 4, fig. 13.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 124, pl. 66 (photo, not good).

Carapace length $\frac{2}{3}$ breadth, similar to *tomentosa* but with numerous short black bristles not forming a felt or coat or concealing the surface; 1 M separated, 2 M completely divided, the two divisions of equal width, 3 M tripartite. Chelipeds and legs bristly like the carapace; tips of finger and thumb blunt but not hollowed.

Length 20 mm., breadth 30 mm.

Locality.—Mozambique (Stebbing).

Distribution.—Mauritius, east coast of Africa, Red Sea, Indo-Pacific.

Remarks.—The specimens identified by Stebbing were not returned to the South African Museum, and I have seen no others.

Actaea parvula (Krauss)

Fig. 43, *g*, *h*.

1843. Krauss, Südafrik. Crust., p. 34, pl. 2, fig. 2, *a–c* (*Menippe p.*).

1910. Lenz, Voeltzkow Reise, ii, p. 549.

1910. Stebbing, *l. c.*, p. 299.

1925. Odhner, *l. c.*, p. 51, pl. 3, fig. 13.

[Not *parvula* de Man 1887, Alcock 1898, Stebbing 1924.]

Carapace length about $\frac{3}{4}$ breadth, covered with granules and with rather long scattered hairs, 1 M not separated, 2 M completely divided, 3 M indistinctly tripartite, all six L areoles present, 6 L indistinctly separated posteriorly. Chelipeds and legs granulate, with longish

bristles and hairs; finger and thumb compressed, scissor-like (as in subgen. *Banareia*), finger closing inside thumb, cutting-edge of latter with a trilobate tooth.

Length 12 mm., breadth 16–17 mm. Orange-yellow, anterior part of 3 M reddish, some of the granules on carapace red, chelipeds and legs yellow, with a few scattered red dots, abdomen pale yellowish, sternum white, hairs glistening whitish.

Localities.—Natal (Krauss); Durban (Odhner); Delagoa Bay (coll. van der Horst).

Distribution.—Madagascar, Red Sea, Ceylon, East Indies, Marquesas Is.

Remarks.—The scissor-like finger and thumb of the chelipeds render this species easily recognizable.

Actaea variolosa Borrad.

1902. Borradaile, F. Geog. Mald. Laccad. Archip., i, p. 256, fig. 54.

1925. Odhner, *l. c.*, p. 63.

Carapace length $\frac{3}{4}$ (description; figure shows $\frac{2}{3}$), bristly, areoles distinct in anterior portion but obsolete posteriorly, with bead-like granules.

Length 6 mm., breadth 8 mm.

Locality.—Durban (Odhner).

Distribution.—Maldives; Indo-Pacific.

Actaea rüppellii (Krauss)

Figs. 37, *d*, 43, *i*, *j*.

1843. Krauss, Südafrik. Crust., p. 28, pl. 1, figs. 1, *a–d* (*Aegle r.*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 787.

1898. Alcock, *l. c.*, p. 144 (references).

1910. Stebbing, *l. c.*, p. 299.

1925. Odhner, *l. c.*, p. 45, fig. 4, and pl. 3, fig. 6 (*rüppelli, sic.*).

1937. Shen, Contr. Inst. Zool. Ac. Peiping, iii, p. 291, fig. 7, *a–d* (*rüppelli orientalis* Odhner).

Carapace length $\frac{3}{4}$ breadth, covered with short bristles and long silky hairs forming a shaggy coat; 1 M not separated, 2 M completely divided (the inner division usually narrower than outer division), 3 M undivided; anterior margin distinctly 4-lobate, longer than postero-lateral margin.

Length up to 22 mm., breadth 30 mm. Yellowish, with orange-red spots or patches, a large one on the gastric region being characteristic.

Localities.—Umlaas River mouth (Krauss); Durban and Port St. Johns (S. Afr. Mus.); Delagoa Bay (Lourenzo Marques Mus.); Mozambique (Hilgendorf, and S. Afr. Mus.).

Distribution.—East coast of Africa, Mauritius, Indo-Pacific to China, Japan, Australia.

Remarks.—Potts records a specimen from South Africa infested with *Thompsonia*, a parasitic Rhizocephalid Cirripede (1915, Carnegie Inst. Wash. Dept. Mar. Biol., viii, p. 8, pl. 1, fig. 4).

Gen. Lachnopodus Stimpson

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 32.

1898. Alcock, *l. c.*, p. 89.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 40.

1925. Odhner, *l, c.*, p. 82.

1941. Gordon, Proc. Linn. Soc. Lond., 153 Sess., pt. 1, p. 127.

Carapace very broad, more or less convex, smooth, regions feebly defined, antero-lateral margin feebly lobed, fronto-orbital width less than half maximum width of carapace. Basal joint of ant. 2 meeting front. Chelipeds more or less unequal. Legs not keeled, 4th joints either smooth or spinose on upper margins.

Lachnopodus subacutus (Stimpson)

1858. Stimpson, *l. c.*, p. 32 (*Liomera s.*).

1865. Heller, "Novara" Crust., p. 11, pl. 2, fig. 1 (*Xantho arcuatus*).

1867. Milne Edwards, Ann. Soc. Ent. Fr. (4), vii, p. 266 (*Xantho bidentatus Xanthodes pachydactylus*, non M. Edw.).

1907. Stimpson, *l. c.*, p. 39, pl. 5, fig. 1 (*Liomera s.*).

1910. Lenz, Voeltzkow Reise, ii, p. 545 (*Carpilodes tristis*, non Dana).

1925. Odhner, *l. c.*, p. 83 (synonymy).

1934. Balss, Faune Col. Franç, v, p. 509 (synonymy).

1938. *Id.*, Medd. Göteb. Mus., lxxv, p. 36.

1942. Ward, Mauritius Inst. Bull., ii, p. 93 (*Lioxantho s.*).

[Not *subacutus* de Man 1902.]

Carapace transversely elliptical, about $\frac{2}{3}$ as long as wide, smooth and glossy, somewhat punctate anteriorly; antero-lateral margin with 5 feeble lobes, the hindmost one being the largest. Chelipeds subequal, smooth, tips of finger and thumb pointed. Legs smooth, glabrous.

Length 15 mm., breadth 23 mm.

Locality.—Europa Is., Mozambique Channel (Lenz).

Distribution.—Chagos; Red Sea; Madagascar; Pacific.

Gen. Liomera Dana

1851. Dana, Amer. J. Sci. (2), xii, p. 124 (genotype: *cinctimanus* White).

1851. *Id.*, *ibid.*, p. 126 (*Carpilodes*, genotype: *tristis* Dana 1852).

1910. Stebbing, *l. c.*, p. 296.

1917. *Id.*, Ann. Durban Mus., ii, p. 5.

1925. Odhner, *l. c.*, pp. 6 and 8 (*Carpilodes*) (key to species).

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 241 (*Carpilodes*).

1934. Gordon, Res. Sci. Ind. Orient. Néerland, iii, fasc. 15, p. 24 (*Carpilodes*).

Carapace very broad, barrel-shaped, convex, regions usually well marked and, especially anteriorly, subdivided into areoles, antero-lateral margin usually divided into 4 broad shallow lobes, postero-lateral margins strongly convergent; front from $\frac{1}{3}$ to $\frac{1}{5}$ greatest width of carapace, deflexed, medianly grooved and slightly notched. Basal joint of ant. 2 partly filling gap between front and inner suborbital angle (fig. 37, *b*). Chelipeds equal or subequal in both sexes, finger and thumb pointed but distinctly grooved near tips. Abdomen of ♂ with 3rd–5th segments fused.

Remarks.—Odhner, while recognizing the priority of *Liomera*, deprecates the substitution of this name for *Carpilodes*, and Miss Rathbun follows the same course.

Doflein (1904) records a young ♀ from the Agulhas Bank, 102 metres (Stebbing, *l. c.*, p. 296).

Key to the South African [Mauritian and Zanzibar] Species.

I. Legs not keeled.
  A. Areole 2M incompletely or not at all divided (fig. 44, *a*).
    1. Carapace without strong granulation, appearing smooth to the naked eye.
      a. Main regions not well marked. Usually a dark ring on hand of cheliped . . *cinctimanus.*
      b. Main regions well marked. No dark band on hand . . . . . [*tristis*].*
    2. Carapace strongly granulate. Legs not knobbly,
      a. Granulation confined to anterior and lateral parts (fig. 44, *a*) . . . . *bellus.*
      b. Whole surface granulate. 4 L and 5 L joined, forming a transverse ridge . [*rugatus*].*

* Figured in Odhner, *l. c.* Also Monod, Mem. Inst. d'Egypte, xxxvii, 1938, p. 121, fig. 13.

B. Areole 2 M completely divided (fig. 44, *c*). All regions well marked.
1. Regions in high relief, strongly granulate. Legs knobbly . . . . . *monticulosus.*
2. Regions in low relief, feebly granulate. Legs smooth . . . . . [*ruber*].*
II. Legs keeled . . . . . [*lophopus*].*

Liomera cinctimanus (White)

1917. Stebbing, Ann. Durban Mus., ii, p. 5.
1925. Odhner, *l. c.*, p. 14.
1930. Rathbun, *l. c.*, p. 242, pl. 100.

Carapace nearly twice as broad as long, antero-lateral margin with 3 very flat lobes, the one following the orbit scarcely or only very feebly convex, 2 M incompletely divided; surface smooth, non-granulate, closely punctate. Basal joint of ant. 2 touching front (Rathbun's figure). Legs not keeled, smooth.

Length 22 mm., breadth 37·5 mm. Odhner mentions a specimen 64 mm. in breadth. Bright red, edges of carapace whitish, in some ♂♂ a black band around hand of cheliped, the finger and thumb of which are brownish black with white tips, dactyls of legs red basally, white distally with black ungues.

Localities.—Europa Is., Mozambique Channel (Lenz); Durban (Stebbing); Delagoa Bay (Coll. K. H. B. 1912).

Distribution.—Mauritius, Indo-Pacific, Japan, and California.

Remarks.—The black band round the hand is sometimes absent in the young (Henderson); Odhner says it is only found in *some* male specimens.

Liomera bellus (Dana)

Figs. 37, *b*, 44, *a*, *b*.

1843. Krauss, Südafrik. Crust., p. 31 (*Xantho obtusus*, non de Haan).
1852. Dana, U.S. Expl. Exp., xiii. Crust., p. 196, pl. xi, fig. 2.
1865. Milne Edwards, Nouv. Arch. Mus. Paris, i, p. 261 (*vaillantianus*).
1910. Stebbing, *l. c.*, p. 297 (*Xantho obtusus*, non de Haan).
1924. Stebbing, Ann. S. Afr. Mus., xix, p. 2 (*Actaea parvula*, non Krauss).
1925. Odhner, *l. c.*, p. 16, pl. 1, fig. 9.

* Figured by Odhner, *l. c.*

Carapace $1\frac{2}{3}$ as broad as long, antero-lateral margin feebly lobate, 2 M incompletely divided, surface strongly granulate anteriorly and laterally, becoming smooth and more or less pitted medianly and posteriorly. Basal joint of ant. 2 nearly filling gap between front

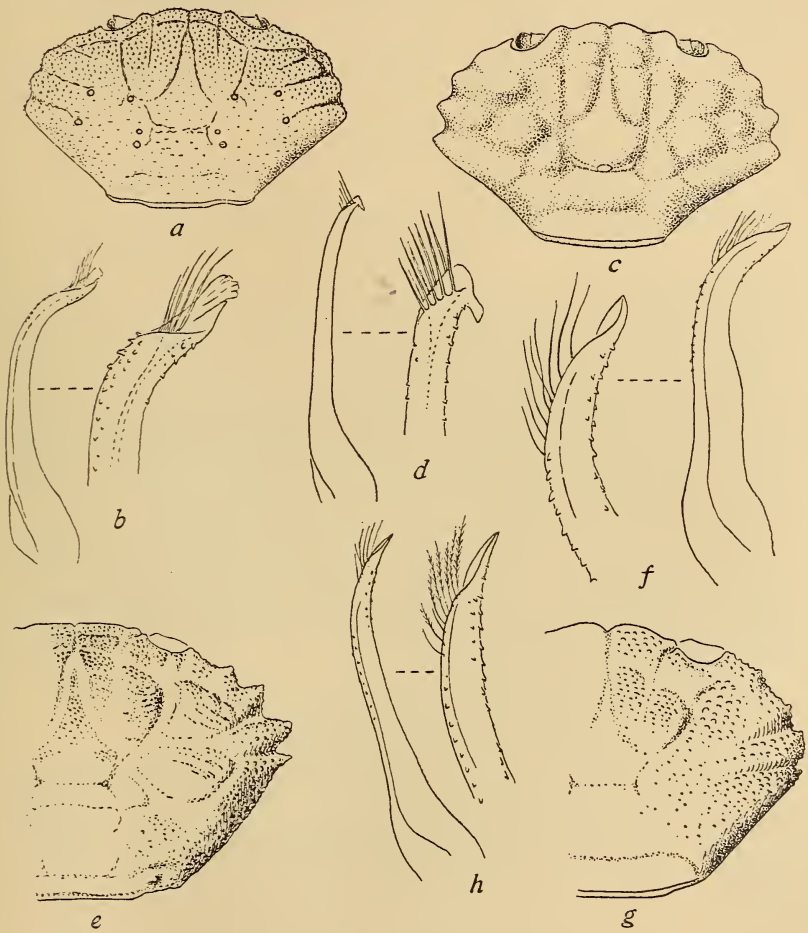


Fig. 44.—*Liomera bellus* (Dana). *a*, carapace. *b*, 1st pleopod ♂, with apex further enlarged.
Liomera monticulosus (M. Edw.). *c*, carapace. *d*, 1st pleopod ♂, with apex further enlarged.
Xanthias tuberculidens Rathbun. *e*, carapace. *f*, 1st pleopod ♂, with apex further enlarged.
Xanthias lamarckii (M. Edw.). *g*, carapace. *h*, 1st pleopod ♂, with apex further enlarged.
The rings in *a* and the oval in *c* represent pale spots (not tubercles).

and inner suborbital angle (fig. 37, *b*). Eye-stalk granulate anteriorly. Legs not keeled, smooth.

Length 9·5 mm., breadth 15 mm. Pink, reddish, or crimson, with 4 or 5 small pale dots on each branchial region as shown in figure, finger and thumb of chelipeds dark brown, with whitish tips, dactyls of legs with distal half white, ungues horn-coloured.

Localities.—Natal (Krauss, Odhner); Europa Is., Mozambique Channel (Lenz); Mozambique (Stebbing); Delagoa Bay (coll. van der Horst).

Distribution.—Mauritius, Indo-Pacific.

Liomera monticulosus (M. Edw.)

Fig. 44, *c*, *d*.

1873. Milne Edwards, Nouv. Arch. Mus., Paris, ix.

1898. Alcock, *l. c.*, p. 86 (*Carpilodes cariosus*, sed non *monticulosus*).

1925. Odhner, *l. c.*, p. 21, pl. 1, fig. 18.

Carapace $1\frac{3}{4}$ as broad as long, antero-lateral margin rather strongly 4-lobate, 2 M completely divided, and all the areoles in high relief, but 1 L, 2 L, and 3 L forming a single areole, 6 L triangular in shape; whole surface strongly granulate. Legs not keeled, but knobbly.

Length 3·5 mm., breadth 6·5 mm. (Odhner's figure). "Yellowish with red spots, legs red" (M. Edwards' text, on plate: uniform deep violet). Uniform crimson-red, finger and thumb of cheliped brown with whitish tips, dactyls of legs with distal one-third white, ungues brown (Delagoa Bay specimen).

Localities.—Durban (Odhner); Delagoa Bay (coll. van der Horst).

Distribution.—Seychelles, India, East Indies to Pacific.

Remarks.—Odhner remarks on the discrepancy in colour between Milne Edwards' text and his coloured figure. The former agrees with Alcock's *cariosus*, the latter is not very different from the present Delagoa Bay specimens, which have been in alcohol for about six months.

Gen. Neoliomera Odhner

Liomera Dana, auctorum, part.

1925. Odhner, *l. c.*, p. 25 (genotype: *pubescens*) (key to species).

Like *Liomera*, but basal joint of ant. 2 embracing the lateral downward-projecting margin of the front, and thus entering the socket of ant. 1 (fig. 37, *c*).

Key to the South African [Mauritian] Species.

1. Areoles well developed. Hand of chela short, 1½ as long as broad . . . . . *sabaea.*
2. Areoles scarcely developed. Hand of chela rather long, 2–2½ as long as broad . . . . . [*pubescens*].*

Neoliomera sabaea (Nob.)

Fig. 37, *c.*

1905. Nobili, Bull. Mus. Hist. Nat. Paris, xi, p. 403 (*Actaea s.*).
1906. *Id.*, Ann. Sci. Nat. Zool. (9), iv, p. 254, pl. 10, fig. 3 (*Actaea s.*).
1925. Odhner, *l. c.*, p. 31, pl. 2, fig. 11.

Carapace a trifle over 1½ as broad as long, with well-developed areoles separated by moderately deep smooth grooves, 1 M and 2–6 L distinctly separated, 2 M completely divided; whole carapace with scattered hairs, and densely granulate, the granules smaller on the hinder portion. Chelipeds and legs granulate, the granules on the former somewhat pointed or conical. Anterior margins of legs hairy, the hairs (as are those on carapace) somewhat thickened or clavate.

Length 12 mm., breadth 20 mm. Reddish, finger and thumb of cheliped brownish purple.

Locality.—Durban (Odhner).

Distribution.—Red Sea, Djibouti, Gulf of Aden, Moluccas.

Remarks.—I have seen only the one ♀ sent to and identified by Odhner.

Gen. Xanthias Rathbun

1852. Dana, Proc. Ac. Nat. Sci. Philad., vi, p. 75 (*Xanthodes*, preocc.).
1897. Rathbun, Proc. Biol. Soc. Wash., xi, p. 165.
1898. Alcock, *l. c.*, p. 156 (*Xanthodes*).
1925. Odhner, *l. c.*, p. 84.
1930. Rathbun, *l. c.*, p. 464.
1938. Balss, Medd. Göteb. Mus., lxxv, p. 47.

Fronto-orbital width greater than half maximum width of carapace. Basal joint of ant. 2 broad and short, but touching deflexed side-margin of front, flagellum subequal to or rather longer than orbit. Chelipeds equal or subequal, tips of finger and thumb pointed.

* Figured by Odhner, *l. c.*

Abdomen ♂ with 3rd–5th segments fused or partially so. 2nd pleopod ♂ very short.

Remarks.—Odhner places *X. lividus* (M. Edw.), from Mauritius, in this genus.

Key to the South African Species.

1. Antero-external angle of 4th joint of mxp. 3 quadrate. Antero-lateral teeth of carapace obtuse . . . *lamarckii.*
2. Antero-external angle of 4th joint of mxp. 3 produced laterally. Antero-lateral teeth acute . . . *tuberculidens.*

Xanthias lamarckii (M. Edw.)

Fig. 44, *g*, *h*.

1834. Milne Edwards, Hist. Nat. Crust., i, p. 391 (*Xantho l.*).
1847. White, Proc. Zool. Soc. Lond., xv, p. 225 (*Xantho cultrimanus*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 789 (*Xanthodes l.*).
1884. Miers, Zool. H.M.S. *Alert* Crust., p. 529 (*Xanthodes l.*).
1898. Alcock, *l. c.*, p. 157 (*Xanthodes l.*).
1925. Odhner, *l. c.*, p. 84.
1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 131, pl. 70.

Anterior and antero-lateral portions of carapace granulate, the granules becoming very small or obsolete centrally and posteriorly; gastric-branchial groove, and 2 grooves across branchial region distinct, but the other grooves faint or more or less obsolescent; antero-lateral margin with 4 granulate obtuse teeth. Chelipeds equal, lower surface of 4th joint granulate, whole of wrist and hand except inner surfaces closely covered with pearly granules, outer surface of hand with 3 parallel furrows (granulate, not smooth). Legs with upper edge of 4th joint finely serrulate, of 5th and 6th joints granulate. Abdomen ♂ with 3rd–5th segments fused. 4th joint of mxp. 3 nearly smooth, antero-external angle quadrate, not produced.

Length 6·3 mm., breadth 10 mm. Yellowish white (Alcock: with bluish-green blotches), finger and thumb of cheliped blackish, the colour not extending on to hand.

Locality.—Mozambique Island (coll. K. H. B. 1912).

Distribution.—East coast of Africa, Mauritius, Amirante Is., Seychelles, Indo-Pacific.

Remarks.—The single specimen was identified by Odhner.

Xanthias tuberculidens Rathbun

Fig. 44, *e*, *f*.

? 1904. Doflein, D. Tiefsee Exp., vi, p. 101 (*Xantho* sp. juv.).
1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 224, pl. 18, fig. 9.
1923. Odhner, Medd. Göteb. Mus., xxxi, p. 26.
1925. *Id.*, *l. c.*, p. 85.

Carapace conspicuously granulate, the granules becoming feebler in the central portion, where they are more like fine squamulae; regions better defined than in *lamarckii*; antero-lateral margin with 4 granulate and conspicuous acute teeth; frontal lobes very slightly convex; a noticeable tubercle near postero-lateral corner. Chelipeds unequal, as in *lamarckii*, but more strongly granulate, especially on wrist and hand, where the granules are more or less nodose, lower surface of hand rugulose. Legs with upper margin of 4th and 5th joints distinctly denticulate, a rather sharply demarcated apical tooth on 4th joint, and a truncate tooth proximally on 5th, outer surface of 5th and 6th granulate and pilose. 4th joint of mxp. 3 granulate, the antero-external angle laterally produced. Abdomen ♂ with 3rd–5th segments fused.

Length up to 17 mm., breadth 24 mm. Finger and thumb of cheliped blackish, the colour not extending on to hand.

Localities.—? Agulhas Bank, 102–155 metres (Doflein); St. Sebastian Bay, 72 metres (Odhner); False Bay and Agulhas Bank as far east as Algoa Bay, 23–100 fathoms (S. Afr. Mus.).

Distribution.—Saya de Malha, N.E. of Madagascar, 125 fathoms.

Remarks.—From the locality and depth it is highly probable that Doflein's specimens belong to this species, rather than to the littoral *Xantho exaratus* (*hydrophilus*).

Gen. Etisus M. Edw.

1834. Milne Edwards, Hist. Nat. Crust., i, p. 410.
1851. Dana, Amer. J. Sci. (2), xii, p. 126 (*Etisodes*).
1910. Stebbing, *l. c.*, p. 298.
1925. Odhner, *l. c.*, p. 83.
1938. Balss, Medd. Göteb. Mus., lxxv, p. 43.
1941. Gordon, Proc. Linn. Soc. Lond., 153 Sess. pt. 1, p. 130.
1942. Ward, Mauritius Inst. Bull., ii, p. 89 (*Etisodes*) and p. 98 (*Etisus*).

Carapace broad, regions moderately well marked, front laminar and prominent, separated from supra-orbital margin by a notch, with median slit; antero-lateral margin with 4–8 lobes or spiniform projections. Basal joint of ant. 2 meeting front, its outer angle produced, flagellum excluded from orbit either by the produced lobe of basal joint, or by the meeting of the upper and lower inner orbital margins (fig. 45, *c*). Chelipeds strong, slightly unequal in ♂, tips of finger and thumb strongly spooned. Abdomen ♂ with 3rd–5th segments fused.

Remarks.—The only South African genus in the group *Hyperolissa* in which the flagellum of 2nd antenna is excluded from the orbit.

Key to the South African Species.

1. 7–8 unequal claw-like teeth on antero-lateral margin. Upper and lower inner orbital angles separated by the process of basal joint of ant. 2. Legs spiny . . [*dentatus*].
2. 4 teeth on antero-lateral margin.
   - *a.* Front nearly straight. Upper and lower inner orbital angles in contact. Cheliped smooth. Legs smooth, but setose . . . . . *laevimanus.*
   - *b.* Front 4-dentate. Upper and lower inner orbital angles not in contact. Chelipeds granulate, wrist and hand knobbly on upper surface. Legs smooth, margins with shaggy fur . . . . . *electra.*

E. dentatus (Herbst) was included in Stebbing's Catalogue (p. 298) on a statement by Miers that it occurred in Natal. Its presence in South Africa has not been confirmed, but it is included in the key on the possibility that it may be found here. Ward (1942) records it from Chagos Archipelago.

Etisus laevimanus Randall

Fig. 45, *c*, *d*.

* 1839. Randall, J. Ac. Nat. Sci. Philad., p. 115.

1851. Bianconi, Spec. Zool. Mosambic, fasc. 5, p. 83, Crust., pl. 1, figs. 1, 1, *a–b* (*macrodactylus*).

1875. Paulson, Red Sea Crust., p. 29, pl. 5, figs. 4, 4, *a–f* (*sculptilis*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 791 (synonymy).

1898. Alcock, *l. c.*, p. 131 (references).

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 262, fig. 57 (*Chlorodius espinosus*).

* For note on date, see Laurie, J. Linn. Soc. Lond., xxxi, p. 425.

1934. Gordon, Res. Sci. Ind. orient. Néerl., iii, fasc. 15, p. 30, fig. 14, A, *c* (plp. 1 ♂).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 121, pls. 64, 65.

1934. Balss, Faune Col. Franç., v, p. 508 (synonymy).

Gastric region well defined, anteriorly distinctly lobulated. Surface of carapace shagreened, microscopically granulate only on the frontal, orbital, and antero-lateral edges. Chelipeds smooth and unsculptured. Upper and lower margins of legs more or less setose, chiefly on upper margin of 4th joints and lower margins of 6th and 7th joints; upper margins of 5th–7th joints more or less granulate; dactyls with tooth at base of unguis, thus appearing bi-unguiculate, but more conspicuous on last two than on first two legs.

Length up to 32 mm., breadth 50 mm. Brownish or reddish, often somewhat mottled, finger and thumb of cheliped black, the colour more or less continued on to palm.

Localities.—Mozambique (Bianconi); Inhambane (Hilgendorf); Delagoa Bay (S. Afr. Mus., Lourenzo Marques Mus., and coll. van der Horst).

Distribution.—Mauritius; Réunion; east coast of Africa; Red Sea; Indo-Pacific.

Remarks.—At first sight very like *Xantho hydrophilus*, but distinguished by the smoother carapace, the smooth chelipeds, 1st pleopod ♂, and of course the exclusion of flagellum of antenna 2 from the orbit; also the dark colour of thumb extends on to palm.

Etisus electra (Herbst)

Fig. 45, *a*, *b*.

—— Herbst, Krabben, III, ii, pp. 34, 36, pl. 51, fig. 6 (quoted from Alcock).

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 34 (*Chlorodius dentifrons*).

1875. Paulson, Red Sea Crust., p. 27, pl. 5, figs. 3, 3, *a*, *b* (*Actaeodes frontalis*).

1884. Miers, Zool. H.M.S. *Alert* Crust., pp. 217, 532 (*Etisodes e.*).

1898. Alcock, *l. c.*, p. 133 (*Etisodes e.*).

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 51, pl. 6, fig. 5 (*Chlorodius dentifrons*), and footnote by editor.

1925. Odhner, *l. c.*, p. 83.

1938. Balss, Medd. Göteb. Mus., lxxv, p. 44.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 158, fig. 41, A (plp. 1 ♂).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 364.

Gastric and other regions well defined. Surface of carapace granulose-rugulose, more distinctly granulate on frontal lobes and antero-lateral margins; 2 M, 2 L, and 3 L with larger but low warts

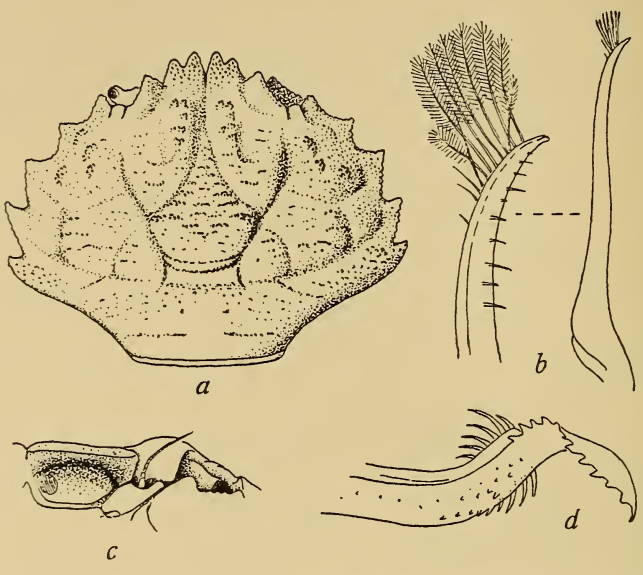


Fig. 45.—*Etisus electra* (Herbst). *a*, carapace. *b*, 1st pleopod ♂, with apex further enlarged.
Etisus laevimanus Randall. *c*, ventral view of front, 1st antenna removed, flagellum of 2nd antenna excluded from orbit. *d*, apex of 1st pleopod ♂.

each composed of several granules. Chelipeds with upper margins of wrist and hand knobbly, upper and outer surfaces distinctly granulate. Upper and lower margins of legs with thick fringe of shaggy hairs, upper edges of 4th–7th joints granulate.

Length up to 15 mm., breadth 20 mm.

Locality.—Delagoa Bay (coll. van der Horst).

Distribution.—Mauritius, Seychelles, Red Sea, Indo-Pacific.

Remarks.—Our specimens correspond excellently with Stimpson's description and figure of his *dentifrons*. They also correspond with Paulson's figure of *A. frontalis*, but not so well with his figure of *E. sculptilis* Heller as regards the frontal margin. Neither Miers nor Alcock quote Paulson.

It would appear that this is a species in which the shape of the

frontal margin is somewhat variable; in fact it might be considered a variety of *anaglyptus* (M. Edw.) (*cf.* Balss, *l. c.*, p. 43).

Key to the South African Genera of Hyperomerista.

I. Flagellum of ant. 2 not excluded from orbit (fig. 47, *h*).
- A. Chelipeds shorter and more slender than the legs . *Lybia.*
- B. Chelipeds longer and stouter than the legs.
  - 1. Fronto-orbital border half or less than half width of carapace.
    - *a*. Basal joint of ant. 2 not touching the front.
      - i. Carapace oval, antero-lateral margin more or less sharply defined.
        - *α*. Carapace smooth, regions ill-defined.
          - * Front, on either side of median notch, cut into 2, or 3 lobules.
            - † Distal margin of 4th joint of 3rd maxilliped nearly straight . *Menippe* and subgen. *Myomenippe.*
            - †† Distal margin of 4th joint of mxp. 3 notched . *Pseudozius.*
          - ** Front, on either side of median notch, entire (fig. 47, *a*) . *Sphaerozius.*
        - *β*. Carapace with regions well defined. Antero-lateral margin continued inwards as a ridge across branchial region (dorsally) . . . . *Pilumnoides.*
      - ii. Carapace subhexagonal, antero-lateral margin rounded, not defined . . . . *Dairoides.*
    - *b*. Basal joint of ant. 2 touching front . *Epixanthus.*
  - 2. Fronto-orbital border exceeding half width of carapace.
    - *a*. Carapace glabrous, regions ill-defined. Basal joint of ant. 2 not touching front . . . . . *Eurycarcinus*
    - *b*. Carapace more or less pilose or hairy, regions more or less well marked. Basal joint of ant. 2 touching (or almost) front.

i. Antero-lateral margin with 4 large dentiform spines (incl. outer orbital angle).
a. Front with 2 large and 2 small lobes. Chelipeds not very unequal . . *Pilumnus.*
β. Front without the small lobes (or with only very feeble ones). Chelipeds very unequal . . . *Parapilumnus.*
ii. Antero-lateral margin with blunt lobes . . . . . *Actumnus.*

II. Flagellum of ant. 2 excluded from orbit, either by a process of basal joint of ant. 2 and/or the meeting of the upper and lower inner orbital angles.
A. Tips of finger and thumb of cheliped spooned. Anterior margin of 4th joint of mxp. 3 deeply notched . . . . . [*Daira*].*
B. Tips of finger and thumb pointed. Anterior margin of 4th joint of mxp. 3 not notched.
1. Fronto-orbital width about ⅔ width of carapace. Front denticulate (fig. 51) . . *Eriphia.*
2. Fronto-orbital width nearly equal to width of carapace, which is subquadrilateral or subhexagonal, smooth, and polished (fig. 52, *a*, *c*, *e*).
a. Front shallowly lobed . . . *Trapezia.*
b. Front finely denticulate . . . *Tetralia.*
c. Front acutely 4-dentate . . . *Quadrella.*

Eurüppellia (or *Lydia*) *annulipes* (M. Edw.) is recorded, as *Euxanthus rugulosus*, by Heller from the Cape (Stebbing, *l. c.*, p. 297). Odhner (1925, *l. c.*, p. 85) doubts the locality, as *E. annulipes* is an inhabitant of coral-reefs. "The Cape" does not necessarily mean the south-west corner of South Africa (see Introduction, p. 2), but the species has not been recorded again from Natal or any other part of South Africa.

Menippe rumphii is a well-known Indian and East Indian species, which, however, has not yet been recorded from South Africa. A specimen in the South African Museum measures 45 × 65 mm. But see Addenda.

Gen. Lybia M. Edw.†

1827. Berthold in Latreille, Fam. Thierr, pp. 255, 584 (*Melia*, nom. preocc. Risso, 1813).

* Mauritius. For figure see Boone, 1934, Bull. Vanderbilt Mar. Mus., v, p. 129, pl. 69.

† Not to be confused with *Lydia* Gistel, =*Eurüppellia*, another Xanthid genus.

1834. Milne Edwards, Hist. Nat. Crust., i, p. 431, footnote, pl. 18, and explanation, p. 16.

1898 and 1899. Alcock, *l. c.*, p. 230 (*Melia*), Illustrat. Zool. "Investigator," Crust., pl. 38, figs. 4, 5.

1934. Balss, Faune Col. Franç., v, p. 519.

Carapace rather depressed, hexagonal, regions not strongly defined; fronto-orbital width about $\frac{3}{4}$ maximum width of carapace, front nearly straight, orbits shallow. Basal joint of ant. 2 scarcely reaching front, flagellum rather long. Chelipeds slender, shorter than walking legs, which are strong, 3rd pair longest; chela slender, finger and thumb with sharp denticles on inner edges for holding the sea-anemones which usually mask the hand. First 2 or 3 segments of abdomen visible dorsally; in ♂ 3rd–5th segments fused.

Remarks.—This Indo-Pacific genus contains about 4 species, including the new one here described. They live amongst corals, and carry a small sea-anemone in each chela; these they hold up in front of them, seemingly as a protection (whence the popular name of Boxing-crab); but the anemone may disable small animals, which the crab thereupon appropriates for its own food.

Key to the South African [Mauritian] Species.

1. Carapace with a single sharp denticle on antero-lateral margin; almost glabrous; red lines forming a polygonal tessellated pattern. Legs ringed. Flagellum of ant. 2 glabrous . . . . . [*tessellata*].
2. Carapace with lobate antero-lateral margin, more or less covered with shaggy (plumose) hairs. Flagellum of ant. 2 setose.
   - *a.* Carapace sparsely furred, with black lines and ocelli . . . . . *leptochelis.*
   - *b.* Carapace densely furred, without colour pattern . *plumosa.*

Lybia tessellata (Latr.)

Fig. 46, *a*, *b*.

1834. Milne Edwards, *l. c.*, p. 431, pl. 18, figs. 8, 9 (*M. tresselata*, *sic* typ. err. after Latreille).

1880. Richters, Beitr. Meeresf. Mauritius, Seych., p. 150, pl. 16, figs. 19–22.

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 250, fig. 49.

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 866 (colour var.).

1911. *Id.*, Trans. Linn. Soc. Lond., xiv, p. 236.

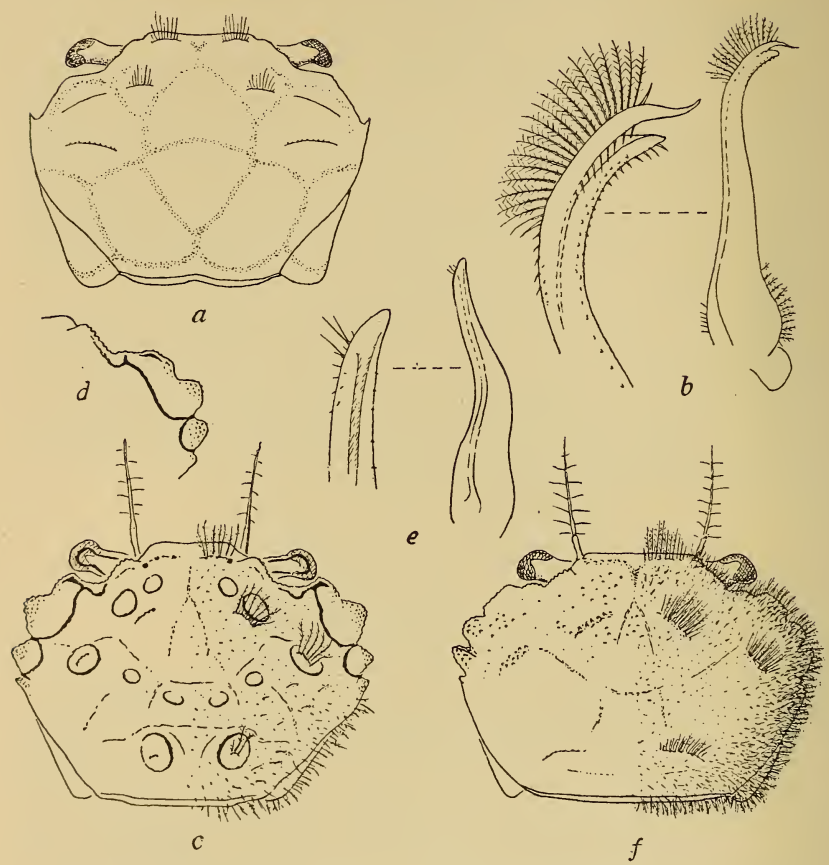


Fig. 46.—*Lybia tessellata* (Latr.). *a*, carapace ♂, Mauritius; dotted bands indicate the colour pattern. *b*, 1st pleopod ♂, with apex further enlarged. *Lybia leptochelis* (Zehntner). *c*, carapace ♀. *d*, antero-lateral portion of carapace ♂. *e*, 1st pleopod ♂, with apex further enlarged. *Lybia plumosa* Brnrd. *f*, carapace ♀.

Carapace almost glabrous, broader than long, antero-lateral margin with one sharp denticle, regions very obscurely marked; 2 weak transverse ridges across hepatic region, the hinder one minutely setulose; a ridge bearing a fringe of plumose setae on either side of the gastric region, and a similar ridge, medianly interrupted, behind the frontal margin. Flagellum of ant. 2 non-setose. Hand of

cheliped with long stiff setae. Legs with long setae and bristles. Abdomen ♂ narrowest at junction of 5th and 6th segments; 6th and 7th segments broader than long, 6th widening slightly distally, 7th subcircular.

Length 10 mm., breadth 14 mm. Creamy, with narrow orange or reddish bands forming polygonal patterns on carapace; abdomen with a longitudinal line on each side of segments 1–4, a transverse line on base of 6th, and a curved line on 7th segment; legs banded with narrow lines.

Distribution.—Mauritius, Seychelles, Hawaiian Is. Although not yet found in South Africa, this species is included for comparison with the following two species.

Lybia leptochelis (Zehntner)

Fig. 46, *c–e*.

1894. Zehntner, Rev. Suisse Zool., ii, p. 174, pl. 7, fig. 9 (*Ceratoplax l.*).

1898. Alcock, *l. c.*, p. 231 (*Melia pugil*).

1899. *Id.*, Illustr. Zool. "Investigator," Crust., pl. 38, fig. 5 (*Melia pugil*).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 236 (*pugil*).

1934. Balss, *l. c.*, p. 519.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 364.

Carapace broader than long, with the regions fairly well marked, more or less tuberculous, tubercles tipped with 1–3 plumose setae, the two most conspicuous ones with tufts of plumose setae; minutely granulate near and on antero-lateral margin, postero-lateral and hind margins more or less setose (plumose setae); antero-lateral margin with 3 lobes, 1st small and more or less confluent with the much larger triangular 2nd, 3rd triangular, rounded in ♂, almost dentiform in ♀, behind which a small denticle or granulate projection. Flagellum of ant. 2 setose. Chelipeds and legs sparsely covered with plumose setae, setae more numerous on the hinder legs. Bases of legs, and also abdomen setose.

Length, ♂ 5·5 mm., ♀ 4 mm., breadth, ♂ 7·25 mm., ♀ 5·5 mm. (Alcock: 5 × 7 mm.). Pale buff, rather dirty or greyish over most of carapace except the centres of the ocelli, antero-lateral lobes clear with a pinkish tinge, black lines (more distinct in ♀ than in ♂) along lobes and around ocelli, on eyes, proximal third of flagellum of ant. 2, mandibles, epistome, and pterygostomial region.

Locality.—Inyack Is., Delagoa Bay (coll. van der Horst, 1 ♂, 1 non-ovig. ♀, with anemone in each claw).

Distribution.—Ceylon, 26 fathoms; Seychelles, 34–47 fathoms; Madagascar.

Lybia plumosa Brnrd.

Fig. 46, *f*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 364.

♀. Carapace broader than long, regions faintly defined, covered with a tomentum, which towards and around the margins is composed of longish plumose setae, giving a shaggy or matted appearance; antero-lateral margin with 3 lobes, the 1st broad and flattened, the 2nd semicircular, the 3rd bluntly dentiform, behind the latter a small denticle; supra-orbital margin finely denticulate, antero-lateral margin less noticeably so; a transverse ridge behind the frontal margin, notched in middle with fringe of long plumose setae; a similar fringed ridge on antero-lateral part of gastric region (proto-gastric), another on the antero-branchial region, and another posteriorly on either side of the cardiac-intestinal region; numerous minute granules, especially on the antero-lateral lobes and anterior regions. Flagellum of ant. 2 setose. Cheliped with shaggy plumose setae except on finger and thumb (a sea-anemone in each chela). Legs thickly covered with shaggy plumose setae. Bases of legs and the abdomen thickly furry.

Length 6·5 mm., breadth 9 mm. Dirty pale buff, without any markings, with brown fur.

Locality.—Umtwalumi, Natal (coll. T. A. Stephenson, 1 non-ovig. ♀).

Remarks.—Resembles the Indian species *caestifer* (Alck.) and *leptochelis* (Zehntner) in the setose antennae and the lobate antero-lateral margin, but differs in the relative shapes and sizes of the lobes, the less defined and non-areolated regions of the carapace, and the denser furry covering on the carapace and legs.

Gen. Pseudozius Dana

1898. Alcock, J. Asiat. Soc. Bengal, lxvii, p. 180.

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 241.

1939. Ward, Amer. Mus. Novit., no. 1049, p. 10.

Carapace transversely oval, very nearly flat or feebly convex, regions not demarcated, antero-lateral border shorter than postero-lateral, obtusely divided into 4 very shallow lobes. Front rather

broad, more than $\frac{1}{4}$ greatest breadth, separated by a notch from the orbit, shallowly 4-lobed. Orbit almost entire, the upper and lower inner angles with only a narrow cleft between them. Basal joint of ant. 2 short, next joint reaching front, flagellum lodged in a notch between front and orbital wall (Alcock says it is excluded from orbit, but it can fold into the cleft between inner orbital angles). Distal margin of 4th joint of mxp. 3 notched. Chelipeds robust, unequal, tips of finger and thumb pointed. Abdomen of ♂ with 7 distinct segments. Pleopod 2 ♂ short.

Pseudozius caystrus (Ad. & White)

Fig. 47, *j–l.*

1848. Adams and White, Voy. "Samarang," Crust., p. 42, pl. 9, fig. 2.

1898. Alcock, *l. c.*, p. 181 (references).

1902. de Man, Abh. Senckenb. Ges., xxv, p. 627.

1902. Borradaile, *l. c.*, p. 241.

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, p. 861.

1911. *Id.*, Trans. Linn. Soc. Lond. (2), xiv, p. 227.

1942. Ward, Mauritius Inst. Bull., ii, p. 95.

Carapace length a little more than $\frac{1}{2}$ the breadth, front $3\frac{1}{2}$ times in greatest breadth; fronto-orbital width $\frac{1}{2}$ breadth of carapace; smooth, almost flat behind the deflexed and rather coarsely punctate fronto-orbital region; antero-lateral border fairly sharp on the last 3 lobes, but obsolete on the 1st (external to orbit). Chelipeds smooth to the naked eye, but sparsely pitted, inner angle of wrist with 2 tubercles, finger and thumb of larger chela ♂ meeting only at tips. Legs smooth, with a few longish marginal setae on 4th (hind margin), 5th, and 6th joints, dactyls furry. Pleopod 1 ♂, fig. 47, *l.*

Length 11·5 mm., breadth 19 mm. Dark blackish brown, somewhat castaneous posteriorly with dark vermiculate markings, 2 pale dots on each antero-branchial region, chelipeds blackish above, castaneous below, finger and thumb black, the black colour not extending on to palm, legs castaneous, setae golden.

Locality.—Port St. Johns (S. Afr. Mus.).

Distribution.—Mauritius, Indo-Pacific.

Gen. Sphaerozius Stimpson

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 35.

1886. Miers, Rep. H.M.S. *Challenger*, xvii, p. 144.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 62.

1932. Balss, Zeitsch. wiss. Zool., cxlii, p. 512.

Carapace transversely oval, convex; regions, except the gastric, feebly defined; front rather prominent, bilobed, each lobe separated by a very feeble notch from the inner supra-orbital tooth; antero-lateral margin with 4 teeth. Basal joint of ant. 2 not nearly reaching front. Chelipeds stout, unequal, tips of finger and thumb pointed. Abdomen ♂ broad, with all 7 segments distinct. Pleopod 2 ♂ elongate.

Sphaerozius nitidus Stimpson

Fig. 47, *a–d.*

1858. Stimpson, *l. c.*, p. 35 (juvenile).

1886. Miers, *l. c.*, p. 144, pl. 12, figs. 4, 4, *a–c.*

1893. Rathbun, Proc. U.S. Nat. Mus., xvi, p. 239 (*Menippe convexa*).

1899. de Man, Notes Leyden Mus., xxi, p. 60, pl. 5, figs. 2, 2, *a–d* (*M. ortmanni*).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 861, pl. xi, fig. 4 (*M. convexa*).

1907. Stimpson (ed. Rathbun), *l. c.*, p. 62, pl. 7, figs. 5, 5, *a* (juvenile).

1910. Rathbun, Mem. Ac. R. Sci. Denmark, ser. 7, v, p. 354, fig. 38 (*M. convexa*).

1913. de Man, Bull. Mus. d'Hist. Nat. Paris, p. 12, pl. 1 (♂ abd.) (*M. ortmanni* = *convexa*).

1913. Klunzinger, Nov. Act. K. Leop. Carol. Ak., xcix, p. 285, pl. 7, fig. 9.

1922. Balss, Arch. Naturg., lxxxviii, p. 115.

1934. *Id.*, Faune Col. Franç., v, p. 517 (synonymy).

1936. Shen, Contr. Inst. Zool. Ac. Peiping, iii, p. 62, figs. 1, *a*, *b* (*M. convexa*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 364.

Carapace strongly convex longitudinally, especially anteriorly, less convex transversely, length a little more than $\frac{2}{3}$ width, smooth, shagreened, the median groove in front of gastric region distinct, with a very indistinct convexity on either side of it, other regions not marked; front prominent, deflexed, minutely granulate, lobes oblique, without demarcated lateral lobes, but separated from inner supra-orbital angle; antero-lateral teeth not prominent, bluntly rimmed, the last one continued backwards as a distinct (rounded) ridge;

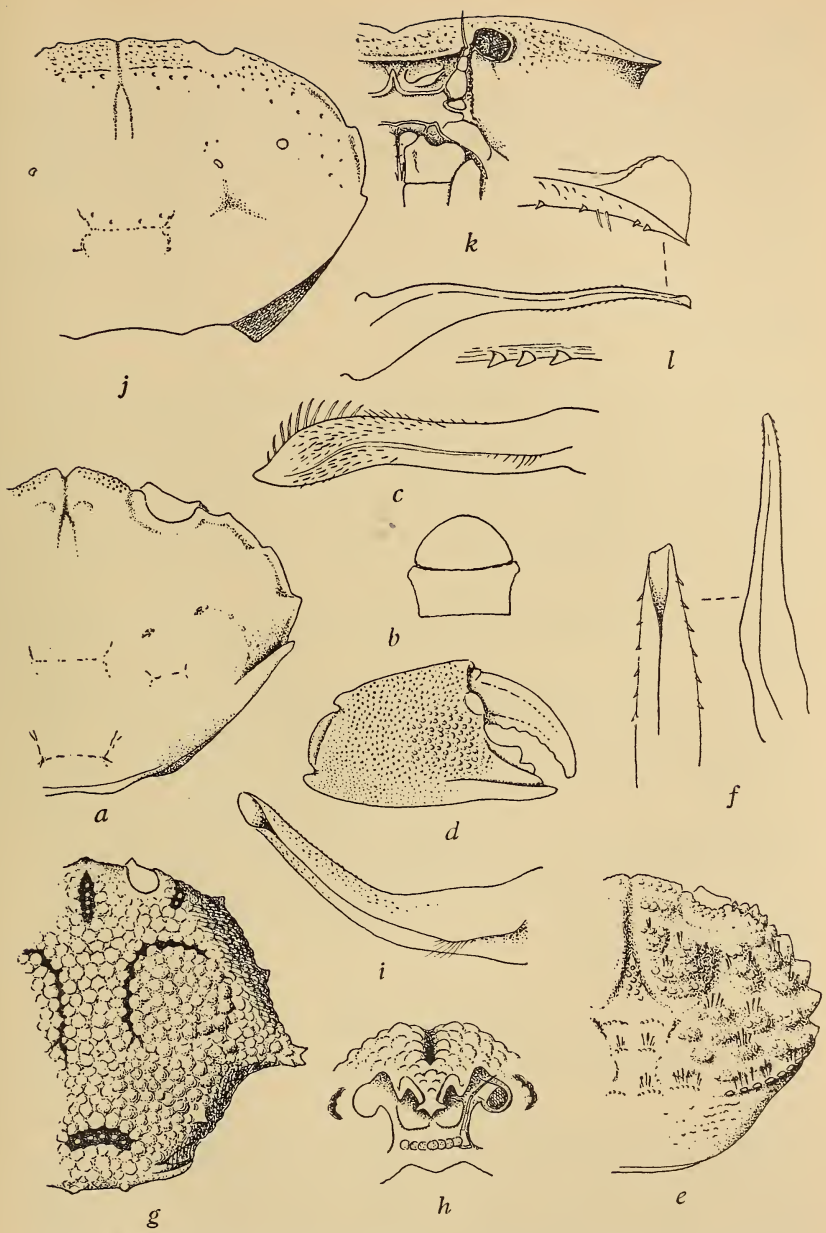


FIG. 47.—*Sphaerozius nitidus* Stimpson. *a*, carapace. *b*, 6th and 7th abdominal segments ♂. *c*, 1st pleopod ♂. *d*, outer view of chela.
Pilumnoides perlatus (Poeppig). *e*, carapace. *f*, 1st pleopod ♂, with apex further enlarged.
Dairoides margaritatus Stebb. *g*, carapace. *h*, frontal view. *i*, 1st pleopod ♂.
Pseudozius caystrus (Ad. & White). *j*, carapace. *k*, ventral view of front, with mxp. 3. *l*, 1st pleopod ♂, with apex further enlarged.

grooves in orbit not present, but upper and lower orbital teeth separated by a shallow notch. Inner upper angle of wrist of chelipeds and inner basal margin of hand of larger cheliped bluntly prominent; upper and outer surfaces of hand of both chelipeds closely and finely granulate; proximal tooth on thumb of larger cheliped large, a marked groove from near tip of thumb parallel with lower margin in both chelipeds. Legs with distal joints setose. Pleopod 1 ♂ stout (apex sometimes blunter than in figure); pleopod 2 slender, longer than pleopod 1, doubled up apically.

Length up to ♂ 16, ♀ 19 mm., breadth ♂ 21, ♀ 26 mm. Reddish or brownish salmon, more or less mottled, the mottling formed of tiny dots, or closely dotted all over carapace; chelipeds, legs, and abdomen also dotted, sternum uniform pale creamy, finger and thumb of chelipeds dark brown, colour not extending on to palm (K. H. B.). Yellow with minute purple dots on carapace and chelipeds (Miers).

Locality.—Delagoa Bay (coll. K. H. B. 1912, and van der Horst, 1939).

Distribution.—Red Sea, Madagascar, Borneo, Siam, China, Japan, Hawaii.

Remarks.—Two specimens have been compared with the type of *convexa* by Dr. Waldo L. Schmitt, to whom my thanks are given. The antero-lateral teeth are slightly more prominent than in the type.

Menippe (*Myomenippe*) *fornasinii* (Bianconi) (1851, Spec. Zool. Mosambic, p. 84, Crust., pl. 2, figs. 1, 1, *a–c*) is recorded from Ibo, Portuguese East Africa, by Hilgendorf (1878, MB. Ak. Wiss. Berlin, p. 795). It closely resembles *S. nitidus*, but has each of the frontal lobes cut into 3 lobules (see also de Man, 1899, Notes Leyden Mus., xxi, p. 57, pl. 7, fig. 1).

Gen. Pilumnoides M. Edw. & Lucas

1843. Milne Edwards and Lucas, d'Orbigny Voy. Amer. Merid., vi, p. 21.

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 534.

Carapace convex, ovoid or subcircular, regions well marked, fronto-orbital width about half width of carapace, front bilobed, antero-lateral margin prolonged inwards and backwards by a small crest behind the last tooth. Endostomial ridges (in buccal cavity) moderately distinct. Chelipeds subequal, stout, tips of finger and thumb pointed. Abdomen with 7 distinct segments. Pleopod 2 ♂ short.

Remarks.—Pacific and Atlantic coasts of South America. The

species mentioned below has been recorded from England, and its presence in South Africa may possibly also be due to accidental transportation.

Pilumnoides perlatus (Poeppig)

Fig. 47, *e*, *f*.

1910. Rathbun, Proc. U.S. Nat. Mus., xxxviii, p. 544, pl. 50, fig. 2.

1930. *Id.*, *l. c.*, p. 535, pl. 216, pl. 217, fig. 3, pl. 218, fig. 3 (references).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 364.

Soft hairs, singly or in small tufts, scattered over surface of carapace. The continuation of the antero-lateral margin across the branchial region almost transverse. Carapace with tubercles more or less forming short transverse ridges or bosses, posterior third nearly smooth medianly. Antero-lateral margin with 5–6 irregular teeth. Chelipeds tuberculate, inner upper edge of hand with 3 large almost dentiform (but blunt) tubercles; on lower half of outer surface of hand (both chelipeds) the tubercles form 3 longitudinal lines, the lower 2 of which are continued as ridges on to the thumb.

Length up to ♀ 26 mm., breadth 36 mm. Smallest ovig. ♀ 15 × 19 mm. Salmon or orange-red, finger and thumb of chelipeds black, the colour not extending on to palm.

Localities.—Bottom of S.A.T.S. *Gen. Botha* in dry-dock Simonstown, June 1933, after lying in Simon's Bay for 4 years (K. H. B. 3 juv.); whaler *Spilla* in dry-dock Cape Town, March 1934, after lying in Saldanha Bay for 3 years (K. H. B. 1 juv.); s.s. *Agnar*, Cape Town, July 1934, after lying in Table Bay for 2 years (K. H. B. 1 juv.); Oudekraal, west coast of Cape Peninsula (some 7 miles from Table Bay), July 1934 (coll. T. A. Stephenson, 1 ♂); Port Nolloth, 1935 (coll. T. A. Stephenson, 1 ♀); Lambert's Bay and Paternoster, 1938 (coll. T. A. Stephenson, ♂♂ and ovig. ♀♀).

Distribution.—Panama to Chile. Specimens, evidently transported by ships, have been recorded from Queenstown, Ireland, and Plymouth, England.

Remarks.—Whether the occurrence of this species in South Africa was originally due to accidental transportation cannot be proved, but it certainly breeds freely, and would probably be found to be quite common if more collecting were done. No specimens were taken by the s.s. *Pieter Faure*. The collections of later Fishery Survey vessels have not been fully examined as yet.

Gen. Dairoides Stebb.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 233.

Endostomial ridges extending to anterior border of buccal cavity. Carapace hexagonal, convex; outer layer with perforate and vesicular tubercles covering entire upper surface except for several narrow fissures, through which the inner layer is visible; surface lumpy but regions obliterated by the granules; front deflexed, narrow tridentate, almost rostriform, separated by deep notches from inner upper orbital angles, inner lower orbital tooth prominent; antero-lateral margin rounded; orbits subcircular. Basal joint of ant. 2 small, separated from front by basal joint of ant. 1, flagellum short. 4th joint of mxp. 3 strongly toothed on outside of base of 5th joint, but with straight anterior margin (not notched as in *Daira*). Chelipeds unequal, tips of finger and thumb pointed, bluntly so in the larger, acutely in the smaller cheliped. Legs slender, spinosely tuberculate, dactyls felted. Abdomen ♂ with 7 distinct segments. Pleopod 2 ♂ longer than pleopod 1, very slender.

Dairoides margaritatus Stebb.

Fig. 47, *g–i*.

1920. Stebbing, *l. c.*, p. 234, pl. 18 (Crust., pl. 98).

Length of carapace (in dorsal view) $\frac{3}{4}$ maximum width, fronto-orbital width $\frac{1}{3}$ maximum width; inner upper and lower orbital angles and the 3 points of the front sharply conical in a 27 mm. long specimen, but blunted in one 33 mm. long (both ♂♂); whole upper surface covered with large rounded vesicular granules or tubercles except for the fissures, which are as follows: one medio-longitudinal near the front, one lateral and external to the orbit, a crescentic pair situated more or less in the position of the gastro-branchial grooves, one transverse between 1 P and 2 P, one crescentic on the upper pterygostomial region; through these fissures the inner layer of the carapace is visible, from which arise tabulate or mushroom-like tubercles. Similar tabulate tubercles are present on the eye-stalks, basal joint of ant. 1, epistome, mxp. 3, ventral surface of carapace, and on the chelipeds and legs; on the wrist and hand of the chelipeds may be observed how the tabulate tubercles coalesce and gradually pass into the vesicular tubercles, eventually concealing the inner layer of the integument. The short felt, which completely covers the dactyls of the legs (except the ungues), is present also as a ring around

the distal ends of the 6th joints, and is continued as a narrow band along under side of 6th joint, about half-way on 2nd and 3rd legs, about one-third on 4th leg (only the distal ring is present on 6th joint of 5th leg). Pleopods 1 and 2 ♂ as figured for *Daira perlata* by Gordon (1934, Res. Sci. Ind. or. Néerl., iii, fasc. 15, p. 50, fig. 27).

Length up to 33 mm., breadth 42 mm. Uniform pale pinkish, finger and thumb of chelipeds slightly darker (as preserved).

Localities.—Durnford Point, Zululand, 90 fathoms (Stebbing; also another not seen by Stebbing, 33 mm. in length); coast of Portuguese East Africa (S. Afr. Mus.). All three specimens are ♂♂.

Gen. Epixanthus Heller

1910. Stebbing, *l. c.*, p. 301.

Carapace transversely oval, flat or moderately convex, regions very obscurely marked; antero-lateral border with a thin sharp edge, regularly fissured or dentate; fronto-orbital margin not exceeding half width of carapace, 4-lobed, separated from orbital margin by a notch. Orbits subcircular. Anterior margin of buccal cavity with a deep narrow (efferent) notch. Basal joint of ant. 2 broad and short, in contact with front, flagellum very short. Chelipeds strong, unequal, finger of smaller cheliped markedly slender, tips of finger and thumb pointed. Abdomen ♂ with distinct segments. Pleopod 2 ♂ elongate.

Epixanthus frontalis (M. Edw.)

Fig. 48, *a*, *b*.

1891. de Man, Notes Leyden Mus., xiii, pp. 14–17, pl. 2, fig. 4.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 60, pl. 7, fig. 4 (*Ozius f.*).

1910. Stebbing, *l. c.*, p. 301.

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 456 (*Galene natalensis*, non Krauss).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365.

Carapace nearly flat, nearly smooth, shagreened or microscopically granulate, antero-lateral margin divided by 4 narrow and shallow fissures into 4 very shallow lobes; front double-edged. Chelipeds and legs smooth; upper edges of 6th joints and whole of dactyls with short stiffish fur.

Length up to 40 mm., breadth 62 mm. Brownish, finger and thumb of chelipeds usually darker.

Localities.—Natal Point (=Durban) (Krauss); Delagoa Bay (Stebbing, as *Galene natalensis*; coll. K. H. B., and Lourenzo Marques Mus.).

Distribution.—Mauritius, Indo-Pacific.

Remarks.—In the small (breadth 30 mm.) Delagoa Bay specimens there are only 3 antero-lateral lobes, the hindermost (4th) being not

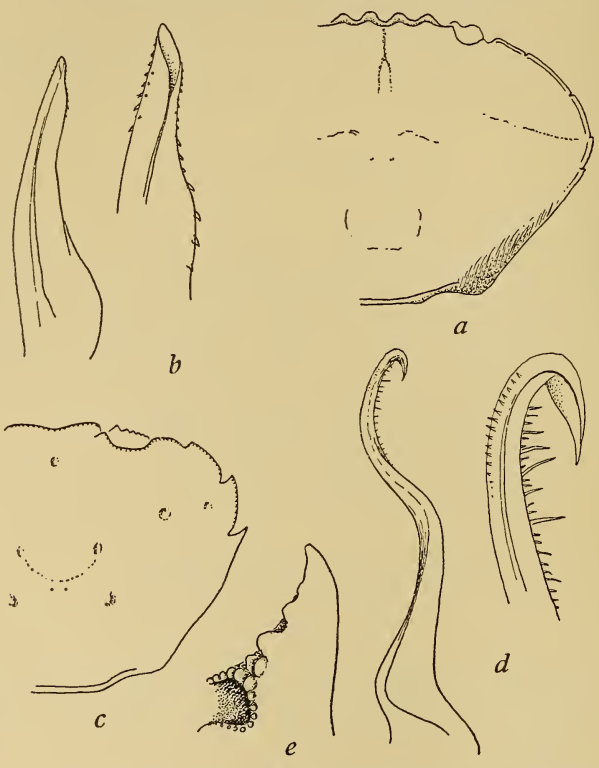


Fig. 48.—*Epixanthus frontalis* (M. Edw.). *a*, carapace. *b*, 1st pleopod ♂, with apex further enlarged (from a specimen 25 mm. in width).
Eurycarcinus natalensis (Krauss). *c*, carapace. *d*, 1st pleopod ♂, with apex further enlarged. *e*, thumb of larger cheliped, finger removed from socket.

developed or only indicated. The epibranchial beaded line which runs to the 3rd lobe varies in distinctness both in the small specimens and in large Mauritian ones.

Gen. Eurycarcinus M. Edw.

1867. Milne Edwards, Ann. Soc. entom. Fr. (4), vii, p. 276.
1887. de Man, J. Linn. Soc. Lond., xxii, p. 43.

1910. Stebbing, *l. c.*, p. 302.

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 456 (*Galene*).

Carapace transversely oval, smooth, regions not defined, front moderately broad, nearly straight, antero-lateral margin with 3 notches. Basal joint of ant. 2 short, not reaching front. Chelipeds unequal, tips of finger and thumb pointed. Abdomen ♂ with 7 distinct segments. Pleopod 2 ♂ ?.

Remarks.—Stebbing (1921) said he could find no reasons for replacing *Galene* by the much later *Eurycarcinus*. *Galene* de Haan, however, belongs to the *Hyperolissa* group and, moreover, has a subquadrilateral carapace.

The specimen described by de Man (*l. c.*, p. 44, pl. 2, figs. 2 and 3 [not 4 and 5]) does not appear from the figure to be the same as *Pilumnopeus maculatus* M. Edw.; compare the direction of the 2nd antero-lateral tooth.

Eurycarcinus natalensis (Krauss)

Fig. 48, *c–e*.

1843. Krauss, Südafrik. Crust., p. 31, pl. 1, figs. 4, 4, *a–d* (*Galene n.*).

1867. Milne Edwards, *l. c.*, p. 277 (*grandidierii*).

1868. *Id.*, Nouv. Arch. Mus. Paris, iv, p. 80, pl. 19, figs. 13–16 (*grandidierii*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 792.

1894. Ortmann, Semon's Austral. Reise, v, p. 49 (references).

1898. Alcock, *l. c.*, p. 211 (*grandidieri*).

1910. Stebbing, *l. c.*, p. 302.

1917. *Id.*, Ann. Durban Mus., i, p. 436, and ii, p. 7, footnote.

[Not Stebbing, 1921, =*Epixanthus frontalis*.]

Front with median emargination, and separated from inner upper orbital angle by a notch; antero-lateral margin with 3 notches; 1st lobe continuous with outer orbital angle, gently rounded, 2nd flat (the lobes of the two sides *converging* anteriorly), 3rd and 4th lobes acutely pointed; fronto-orbital and antero-lateral margin beaded, lower orbital margin more strongly granulate; a shallow pit in each branchio-cardiac groove, and 2 on each branchio-hepatic region, more or less conspicuous. Chelipeds smooth, thumb of larger cheliped with 2 pairs of blunt teeth (4 in a double row) near base followed by a larger tooth, this again by a smaller one (M. Edwards' figure is better than Krauss'). Pleopod 1 ♂ slender, spirally curved.

Length up to 26 mm., breadth 38 mm. Carapace and chelipeds

reddish or violaceous, finger and thumb of chelipeds dark; legs greyish.

Localities.—Mouth of Umlaas River, Natal (Krauss); Durban (Stebbing, and S. Afr. Mus.); Inhambane and Ibo (Hilgendorf); Delagoa Bay (coll. van der Horst).

Distribution.—Madagascar, east coast of Africa, Red Sea, Nicobar Is.

Gen. Pilumnus Leach

1910. Stebbing, *l. c.*, p. 301.

1923. Rathbun, Biol. Res. "Endeavour," v, p. 108 (key to Australian species).

1930. *Id.*, *l. c.*, p. 481.

1931. Gordon, J. Linn. Soc. Lond., xxxvii, pp. 526, 539 *sqq.*

1933. Balss, Capita Zool., iv, 3, p. 10 (sensu restricto).

Carapace transversely oval or subquadrilateral, regions usually, but moderately, well marked; front bilobed, each lobe laterally with a small notch which is separate from the inner supra-orbital tooth; antero-lateral margin dentate, the teeth often spiniform; inner suborbital angle often prominent; supra-orbital margin with one or two notches. Basal joint of ant. 2 short, not or only just reaching front. Chelipeds stout, not very unequal, tips of finger and thumb pointed. Legs usually stout. Abdomen ♂ with distinct segments. Pleopod 2 ♂ short. Carapace, chelipeds, and legs usually thickly covered with short pile, with or without longer bristles or hairs.

Remarks.—As Gordon indicates, a revision of this genus with particular attention to the 1st pleopod ♂ is very desirable.

Hale (1931, Rec. S. Austr. Mus., iv, p. 321, figs.) has shown that *P. vestitus* Hasw. hatches at an advanced stage of development.

Key to the South African Species.

1. A subhepatic tubercle.
   - *a.* Very thickly covered with dark shaggy and matted hairs. Carapace with low rounded granules . *vespertilio.*
   - *b.* With fine golden pubescence and longer bristles. Carapace smooth. Flagellum of ant. 2 not longer than orbit . . . . . *hirsutus.*

2. No subhepatic tubercle. Flagellum of ant. 2 considerably longer than orbit.
   - *a.* With short pile and longer scattered bristles. Finger and thumb of chelipeds smooth, glabrous. Upper margin of 4th joint of 2nd–4th legs spinose . . . . . *longicornis.*

b. With long thick silky hairs anteriorly on carapace, chelipeds, and legs. Finger and thumb granulate and setose almost to tips. Upper margin of 4th joint of legs smooth . . . . . *trichophoroides.*

Pilumnus vespertilio Fabr.

Fig. 49, *a*, *b*.

1849. Milne Edwards in Cuvier, Règne Anim. Crust., pl. 14, figs. 3, 3, *a*, *b*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 793.

1898. Alcock, *l. c.*, p. 192 (references).

1933. Balss, *l. c.*, p. 21.

Carapace nearly $\frac{3}{4}$ as long as wide; front bilobed, with median fissure and fairly distinct lateral tooth; supra-orbital margin with 2 deep notches; 3 sharp teeth on antero-lateral margin behind outer orbital angle; a subhepatic tooth; low rounded granules over whole carapace, but larger anteriorly (when denuded showing pits for insertion of the hairs); infra-orbital margin entire, inner suborbital tooth distinct but not very sharp. Endostomial ridges distinct up to anterior margin of buccal cavity. Upper and outer surfaces of wrist and hand of chelipeds granulate, granules extending on to lower surface of hand of smaller, sometimes also of larger, cheliped. Legs granulate. Carapace, chelipeds, legs, and under surface covered with a thick coat of dark shaggy, matted hairs, the longest hairs being on the chelipeds (except the non-granulate part of larger one), legs and margins of carapace.

Length up to 17 mm., breadth 22 mm.

Localities.—Ibo and Mozambique (Hilgendorf); Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius, east coast of Africa, Red Sea, Indo-Pacific.

Pilumnus hirsutus Stimpson

Fig. 49, *d*, *f*, *g*.

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 37.

1898. Alcock, *l. c.*, p. 197 (with ?).

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 69, pl. 9, fig. 1.

1918. Stebbing, Ann. Durban Mus., ii, p. 53 (*spinifer*, non M. Edw.).

1922. Balss, Arch. Naturg. Abt. Syst., lxxxviii, p. 117 (references).

1923. Rathbun, Biol. Res. "Endeavour," v, p. 122, pl. 28.

1933. Balss, *l. c.*, p. 20.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 407, fig. 11 (1st plp. ♂).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 146, figs. D–F (orbit, abd., plp. 1 ♂).

[? 1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 247, fig. 47 (*maldivensis*).

? 1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 229, pl. 16, figs. 14, 15 (*orbitospinis*).

? 1916. Parisi, Atti Soc. Ital. Milan, lv, p. 185 (*orbitospinis*).]

Carapace convex, declivous anteriorly, length $\frac{3}{4}$ width, smooth, regions scarcely distinguishable, but the anterior median groove distinct; front not quite $\frac{1}{3}$ width of carapace, bilobed, lobes slightly oblique, with small feebly demarcated lateral lobule, separated from the blunt inner orbital tooth by a well-marked groove; upper orbital margin smooth, without or with very feeble trace of notch, outer orbital tooth spiniform; infra-orbital margin denticulate, inner angle sharp, spiniform and prominent; antero-lateral margin with 3 spiniform teeth, the spine-like tips distinct; one denticle and some granules on subhepatic region. Endostomial ridges indistinct near anterior margin of buccal cavity. Flagellum of ant. 2 not longer than orbit. Chelipeds with 2 strong spiniform teeth, preceded by some denticles, on upper margin of 4th joint; upper and outer surfaces of wrist and hand, except lower portion of hand in the larger one, with tubercles (mostly conical), forming on upper margin of hand 2 rows, each with 4–5 tubercles in larger, 3–4 in smaller cheliped. Legs with a small spine at apex of upper margin of 4th and 5th joints, and 1 or sometimes 2 about in middle of upper margin of 4th joint (except on last leg.) Terminal abdominal segment ♂ slightly shorter than its basal width. Pleopod 1 ♂ with 1–2 large spines below the out-curved tip. Carapace, chelipeds, and legs with short golden pubescence and longer hairs, the latter especially on the anterior half of carapace, and on chelipeds and legs.

Length up to (ovig. ♀) 8 mm., breadth 10 mm. (11 mm. if spines incl.). Largest ♂ 7·5 × 9 mm. Pale yellowish, finger and thumb of chelipeds brownish, dark colour not extending on to hand.

Localities.—False Bay (Buffels Bay near Simonstown, and Somerset Strand), Algoa Bay, off East London, off Port Shepstone, 0–85 fathoms (S. Afr. Mus.); Durban (Stebbing).

Distribution.—hirsutus: Amirante Is., Andaman Is., East Indies, China, Japan.
maldivensis: Maldive Archipelago.
orbitospinis: Chagos Archipelago and Japan.

Remarks.—The above description is based solely on the South African specimens. The armature of the legs corresponds with Borradaile's description of his *rotundus* (1902). Rathbun does not mention the armature on the legs of *orbitospinis*, and Parisi mentions only the 4th joint as having an apical spine. Neither Borradaile, Rathbun, nor Parisi refer to the subhepatic region; Stimpson and Alcock state definitely that there is no subhepatic tooth in *hirsutus*. One has a strong suspicion that Alcock's, Borradaile's, and Rathbun's specimens are all one species, probably *hirsutus*; but a strict comparison is not possible on the published descriptions.

The incidence of the localities in South Africa is notable: all are where ships have called and anchored for many years. Port Shepstone was open to small coasting vessels in former days.

Pilumnus hirsutus var.

Fig. 49, *e*.

Four specimens collected at "Hoetjes Bay" [*sic*, see note, p. 322] by the s.s. *Pieter Faure*, the largest a non-ovigerous ♀ 8·5 × 10 mm. These differ only as follows: the median groove is less well marked, but the gastric-hepatic groove is slightly more distinct, the frontal lobes are slightly less oblique, especially in the largest specimen, the spiniform tips to the antero-lateral teeth are less prominent (fig. 49, *e*, right side), sometimes uncinately procurved, but in most cases absent (fig. 49, *e*, left side), the outer orbital tooth is either subacute or blunt, the inner suborbital tooth is blunt in all cases, the chelipeds in the juv. are less strongly tuberculate.

These specimens are clearly only a variety of the species above described as *hirsutus*. They are given separate mention because the locality, if "Hoetjes" Bay means Saldanha Bay, is on the west coast. It is likewise a shipping harbour.

Pilumnus longicornis Hilg.

Fig. 49, *c*.

1838. McLeay, Annulosa S. Afr., p. 61 (*Curtonotus vestitus*, non de Haan).

? 1843. Krauss, Südafrik. Crust., p. 33 (*Curtonotus vestitus*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 794, pl. 1, figs. 8, 9.

1886. Miers, Rep. H.M.S. *Challenger*, xvii, p. 157.

1887. de Man, J. Linn. Soc. Lond., xxii, p. 59, pl. 3, figs. 5, 6 (*andersoni*).

1898. Alcock, *l. c.*, p. 193.

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 228.

1933. Balss, *l. c.*, p. 15, and subspp., pp. 16, 17, pl. 2, figs. 10, 11.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 406, pl. 6, fig. 3.

1938. Monod, Mem. Inst. d'Egypte, xxxvii, p. 135, fig. 17, F (plp. 1 ♂).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 144, fig. 36, A (plp. 1 ♂).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365.

Carapace nearly $\frac{3}{4}$ as long as wide (Alcock's $\frac{7}{9}$ seems too high); front $\frac{2}{7}$–$\frac{1}{3}$ width of carapace, declivous, bilobed, with median notch and distinct lateral tooth; supra-orbital margin with 2 not very distinct notches; 3 sharp spinate teeth, often with subsidiary granules, on antero-lateral margin; some conical granules, but no tooth or tubercle, on subhepatic region; numerous but scattered granules anteriorly and laterally; infra-orbital margin denticulate, especially the inner orbital tooth. Endostomial ridges moderately distinct up to anterior margin of buccal cavity. Flagellum of ant. 2 (if not injured) nearly half length of carapace, with a few outstanding setae. Upper margin of 4th joint of chelipeds with 2 large, more or less sharp, teeth, upper surface of wrist and hand granulate; outer surface of hand of larger cheliped granulate on its upper and basal portions, smooth below, of smaller cheliped with granules extending on to lower surface, more or less in longitudinal rows; finger and thumb smooth and glabrous. Legs finely granulate, upper margin of 4th joint spinose (feebly so in 5th leg). Pleopod 1 ♂ as in *vespertilio* (fig. 49, *b*). Carapace, chelipeds (except the non-granulate part of larger one), legs, and under surface covered with short thick fur, with scattered longer bristles and hairs, especially on anterior part of carapace, chelipeds, and legs.

Length up to 21 mm., breadth 31 mm. Reddish, non-granulate part of hand of larger cheliped paler, finger and thumb blackish (dark colour not extending on to hand).

Localities.—Inhambane (Hilgendorf); Durban and Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius (S. Afr. Mus.), Seychelles, Indian Seas, East Indies, Pacific.

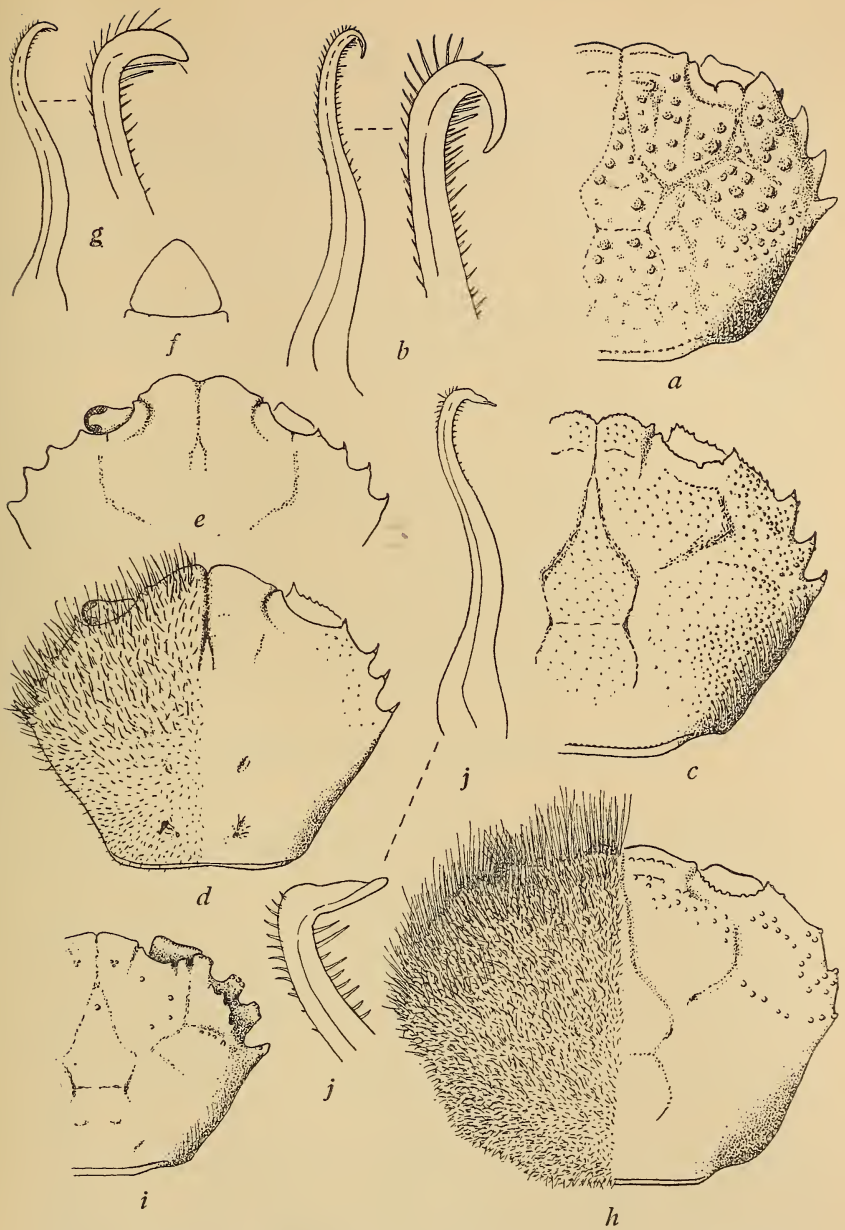


Fig. 49.—*Pilumnus vespertilio* Fabr. *a*, carapace, denuded. *b*, 1st pleopod ♂, with apex further enlarged.

Pilumnus longicornis Hilg. *c*, carapace, denuded (front declivous, but drawn as if fully visible in dorsal view).

Pilumnus hirsutus Stmpsn. *d*, carapace, partly denuded. *e*, carapace of Hoetjes Bay specimens, showing variation in antero-lateral teeth. *f*, 7th abdominal segment ♂. *g*, 1st pleopod ♂, with apex further enlarged.

Pilumnus trichophoroides de Man. *h*, carapace, partly denuded (front declivous, but drawn as if fully visible in dorsal view).

Parapilumnus pisifer (McLeay). *i*, carapace, denuded. *j*, 1st pleopod ♂, with apex further enlarged.

Remarks.—The correct identification of McLeay's specimen is due to Mr. Ward, who has sent me an excellent photograph of it. The identity of Krauss' specimen can only be determined by re-examination of the original.

de Man (*l. c.*, p. 65) says that *longicornis* may be easily distinguished from *andersoni* by its non-spiniform antero-lateral teeth. The three specimens at hand, and also one from Mauritius (coll. Robillard), seem to indicate that this is merely a variable feature, or an accidental difference: de Man's words "dark-pointed, spiniform teeth" apply except where these spiniform tips have been broken off.

The resemblance of this species to *Actaea depressa*, due mainly to the flatness of the hinder part of the carapace, is striking enough to be confusing on a cursory glance, especially if the specimen is not denuded of its covering. The differences lie in the greater length of 2nd antennae, and greater width of front in *longicornis*; the closer and more regular granulation of the carapace, with conical granules on the front; and the more strongly marked delimitation of the regions in *A. depressa*. The 1st pleopods of the ♂♂ are quite distinct.

Pilumnus (*Heteropilumnus*) *trichophoroides* de Man

Fig. 49, *h*.

See 1933. Balss, *l. c.*, p. 42. *Cf.* also *P. digitalis*: 1923. Rathbun, Biol. Res. "Endeavour," v, p. 112, pl. 22.

Carapace about $\frac{3}{4}$ as long as wide, front bilobed, declivous, about $\frac{3}{10}$ width of carapace, with median notch but without distinct lateral lobes; inner orbital angle scarcely distinct from lateral angle of front, supra-orbital margin granulate, but without distinct notches; 3 inconspicuous denticles on antero-lateral margin, each tipped with a granule; no subhepatic tubercle or granules; a few granules scattered near anterior part of front (proto)-gastric and hepatic regions, and a curved line of granules from the last antero-lateral denticle; infra-orbital margin quite smooth. Flagellum of ant. 2 nearly half length of carapace, glabrous. Upper margin of 4th joint of chelipeds smooth, upper surface of wrist and hand granulate, whole outer surface of hand in both chelipeds granulate, finger and thumb granulate and setose almost to tips; inner surface of hand (palm) and finger and thumb smooth. Legs smooth, upper margin of 4th joint not spinose. Carapace, chelipeds, and legs with short thick fur, and especially anteriorly on carapace, chelipeds, and legs long dense silky hairs.

Length 12 mm., breadth 16·5 mm. Carapace when denuded dirty white, fur drab, silken fringes pale golden.

Locality.—Delagoa Bay (coll. van der Horst, 1938, 1 ♀).

Distribution.—*trichophoroides*: Red Sea, Chagos, East Indes, Siam, China Sea.

digitalis: Queensland.

Remarks.—This ♀ specimen appears to be *trichophoroides*, but the ♂ is necessary for a certain identification.

Gen. Parapilumnus de Man

1895. de Man, Arch. Naturg. Abt. Syst., viii, p. 537.

1933. Balss, *l. c.*, p. 38.

Scarcely distinct from *Pilumnus*, but distinguished by the very unequal chelipeds.

Parapilumnus pisifer (McLeay)

Fig. 49, *i*, *j*.

1838. McLeay, Annulosa S. Afr., p. 60 (*Halimede p.*).

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 36 (*Pilumnus verrucosipes*).

1873. Milne Edwards, J. Mus. Godeffroy, i, p. 80, pl. 1, fig. 4 (*Pilumnus fragifer*).

1881. Miers, Ann. Mag. Nat. Hist. (5), viii, p. 216, pl. 13, fig. 5 (hand of cheliped) (*verrucosipes*).

1894. Ortmann, Semon's Austral. Reise, v, p. 49, pl. 3, fig. 7 (*infraciliaris*).

1904. Doflein, D. Tiefsee Exp., vi, p. 100, pl. 32, figs. 3, 4 (photos, not good) (*verrucosipes*).

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 67, pl. 8, fig. 5 (*verrucosipes*).

1910. Stebbing, *l. c.*, p. 298 (*Halimede pisifer*) and p. 302 (*verrucosipes*).

1914. Lenz and Strunck, D. Südpol. Exp., xv, p. 281 (*verrucosipes*).

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 64 (*verrucosipes*).

1921. Rathbun, Bull. Amer. Mus. Nat. Hist., xliii, p. 437, fig. 18, and pl. 35, fig. 3, pl. 36, fig. 1 (*verrucosipes*).

1933. Monod, Bull. Com. Afr. occid. Fr., xv, p. 76 (*verrucosipes*).

1933. Balss, *l. c.*, p. 39 (*verrucosipes*).

1934. Gordon, Res. Sci. Ind. orient. Néerl., iii, fasc. 15, p. 59, fig. 31, *f* (endostom. ridges) (*verrucosipes*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365.

Carapace about $\frac{2}{3}$ as long as wide; front glabrous, slightly oblique on either side of median fissure, lateral lobule obscure but separated by a shallow groove from the blunt inner supra-orbital tooth; supra-orbital margin with 2 deep notches; 3 teeth on antero-lateral margin behind outer orbital tooth, the latter often blunt and apically granulate, as are the first 2 antero-lateral teeth; the hindmost tooth, however, is always sharp; small isolated granules on antero-gastric, hepatic, and branchial regions, the anterior gastric pair often represented by a group of 2–4 granules, the 2–4 hepatic granules rather prominent, one or two of them sometimes multiple; infra-orbital margin thick and protuberant, sausage- or dumb-bell-shaped, blunt at both ends. Endostomial ridges obscure or petering out before reaching anterior margin of buccal cavity. Upper margin of wrist and hand of chelipeds with large, spaced, rounded tubercles, each one granulate on top, outer surface of hand of larger cheliped with rounded granules on upper and basal part, in smaller cheliped with more numerous sub-conical granules. Upper margins of 5th and 6th joints of legs each with 2 large granulate warts. Carapace, chelipeds, legs, and under surface covered with short close pile, with scattered longer shaggy hairs on chelipeds and carapace.

Length up to 12 mm., breadth 18 mm. Smallest example examined 4 mm. in length. Smallest ovigerous ♀ 6·5 mm. in length. Salmon-red, orange-red, brownish red or brownish purple, more or less mottled, finger and thumb of chelipeds blackish (dark colour not extending on to hand), tips whitish.

Localities.—Simon's Bay, 12 fathoms (Stimpson, also Lenz and Strunck); Port Elizabeth (Ortmann); Plettenberg Bay, shallow water (Doflein); Mossel Bay, 10 fathoms (Stebbing); False Bay to Algoa Bay, East London, and Durban, 0–18 fathoms (S. Afr. Mus.); Durban and Umhlali (coll. T. A. Stephenson); St. Lucia Bay, Zululand (S. Afr. Mus.).

Distribution.—Goree Is., Senegambia, Port Etienne (Mauretania), French Congo, St. Paul de Loanda.

Remarks.—Comparison of a photograph of McLeay's type (for which I am indebted to Mr. Ward) with the reproduction of a photograph of Rathbun's Belgian Congo specimen leaves no doubt of the synonymy; McLeay's type specimen is not cleaned, and Rathbun's photographic reproduction is not very sharp, but with a slight re-arrangement of the legs one might think that the two photographs had been taken from the same specimen! McLeay's description "three great tubercles surrounding each orbit, one occupying its

external angle, and the two others the lower edge of orbit," is very apt; in some specimens the thick infra-orbital ridge is so strongly dumb-bell-shaped that one could well describe it as two tubercles.

It was only to be expected that a specimen of this very common crab was included in Sir Andrew Smith's or Verreaux's collection (described by McLeay), but it is a pity that McLeay did not illustrate his *pisifer*, which would then not have remained so long unrecognized.

This little crab, unmistakable on account of the pea-like verrucosities on its chelipeds and the sausage-like infra-orbital ridge, is one of the commonest littoral and shallow-water species from False Bay eastwards. It is impossible to say whether it has spread eastwards by the help of ship transport. It has not yet been found in Table Bay or anywhere on the west coast of South Africa, but reappears from Loanda northwards.

Gen. Actumnus Dana

1898. Alcock, *l. c.*, p. 200.
1911. Rathbun, Trans. Linn. Soc. Lond., xiv, pp. 230 *sqq.*
1923. *Id.*, Biol. Res. "Endeavour," v, p. 126.
1933. Balss, Capita Zool., iv, p. 35.
1942. Ward, Mauritius Inst. Bull., ii, p. 43.

Carapace strongly convex, regions moderately well defined; front bilobed, usually with a small notch near inner supra-orbital tooth; antero-lateral margin with blunt lobes. Basal joint of ant. 2 touching front. Chelipeds stout, more or less unequal, tips of finger and thumb spooned or bluntly pointed. Sternum narrow. Abdomen ♂ with 7 distinct segments, the first trapezoidal, 2nd somewhat widened, following segments gradually narrowing to apex. Plp. 1, 2 ♂, see Stephensen, *l. c.*, *infra*, fig. 35, C, D (*A. asper*).

Actumnus setifer (de Haan)

Fig. 50.

1898. Alcock, *l. c.*, p. 202 (*tomentosus*) (*setifer* Alck. = *obesus* Dana).
1927. Hale, S. Austral. Crust., pt. 1, p. 167, fig. 168.
1933. Balss, *l. c.*, p. 38.
1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 143.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365.

Carapace very convex, covered with a very short, close, velvety pile composed of stout, spinate setae, which almost conceals (*v. infra*:

colour) the scattered granules; slightly longer bristles on margins and front; regions well marked by wide shallow grooves; front declivous with median notch, and a faint notch at inner orbital angle; antero-lateral margin divided into 4 broad shallow lobes separated by 3 small notches which are nearly concealed by the pile and marginal setae; supra-orbital margin granulate. Eye-stalk covered with spinate setae. Basal joint of ant. 2 just touching front, flagellum in the orbital hiatus. Chelipeds stout, slightly unequal, outer and upper surfaces of wrist and hand covered with pile, upper surface of wrist and outer and upper surfaces of hand granulate, the granules becoming larger on middle of outer surface of hand, and towards bases of finger and thumb, where

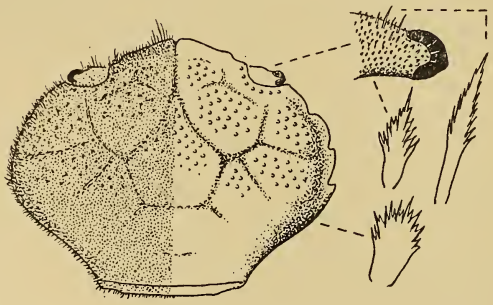


Fig. 50.—*Actumnus setifer* (de Haan). Carapace, partly denuded, with eye and setae further enlarged. Ovig. ♀.

they are also more closely set; base of finger granulate; tips of finger and thumb bluntly pointed (not spooned). Upper margin of 4th–6th joints of legs keeled, upper and lower margins setose, bristly, outer surface of 5th and 6th joints pilose, with a few scattered granules, dactyl setose.

Length 10 mm., breadth 13·5 mm. Carapace pale (dirty) biscuit-colour, shading into red on frontal and antero-lateral margins, and hepatic and branchial regions; on the pale portions the granules show through the pile as little white dots, and on the reddish portions as deeper red dots. Front part of eye-stalk reddish, upper part whitish. Chelipeds deep red, finger and thumb brownish red, with white tips. Legs reddish on outer surfaces, pale pinkish on inner surfaces.

Locality.—Impengazi, north of St. Lucia Bay (coll. T. A. Stephenson, 1939, 1 ovig. ♀).

Distribution.—Mauritius, Red Sea, Zanzibar, Indo-Pacific to Australia and Japan.

Gen. Eriphia Latr.

1910. Stebbing, *l. c.*, p. 302.

1930. Rathbun, *l. c.*, p. 545.

Carapace deep, subquadrilateral, not very convex, only the gastric region defined; lateral margin convex, without any well-marked division into anterior and posterior portions; fronto-orbital margin very wide, front deflexed, externally in contact with the very broad inner lower angle of orbit, which is overlapped by the inner upper angle, thus completely closing the orbit. Basal joint of ant. 2 small. flagellum excluded from orbit. Chelipeds massive, unequal, finger and thumb strong, tips pointed. Abdomen ♂ with 7 distinct segments. Endostomial ridges strong (fig. 37, *f*). Pleopod 2 ♂ elongate.

Key to the South African Species.

1. Front cut into blunt teeth. Carapace dorsally without hairs.
   - *a*. Both chelae smooth (to the naked eye) . . . *laevimanus*.
   - *b*. Both chelae, or at least the smaller one, tuberculate . *smithii*.
2. Front not cut into teeth. Carapace dorsally with numerous scattered hairs . . . . . *scabricula*.

Eriphia laevimanus Guérin

1803. Shaw in Shaw and Nodder, Nat. Misc., xv, p. 591 (*sebana*) (*fide* Rathbun).

1829–44. Guérin, Icon. Règne Anim. Crust., pl. 3, fig. 1.

1838. McLeay, Annulosa S. Afr., p. 60 (*fordii*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 797.

1898. Alcock, *l. c.*, p. 214 (references).

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 381.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 159, pls. 81-84 (*sebana*).

1939. Ward, Amer. Mus. Novit., no. 1049, p. 11, figs. 13, 14 (*sebana hawaiiensis*).

Front dentate. Carapace dorsally granulate and tuberculate in anterior half, becoming smooth (to the naked eye) but really minutely granulate (or shagreened) in centre and posterior half, without hairs. Chelipeds smooth to the naked eye, but minutely granulate, with indications (at least in the smaller cheliped) of larger, depressed granules on outer surface of wrist and hand.

Length up to 30 mm., breadth 40 mm. Reddish orange, with darker spots and vermiculations on a paler ground-colour on the lateral and hinder parts of carapace; pterygostomial region, 3rd maxillipeds and epistome white with orange markings; outer surface of hand of larger cheliped with rows of orange spots on a paler ground; finger and thumb of chelipeds more or less brownish black.

Localities.—Natal (Krauss, and S. Afr. Mus.); Mozambique (Hilgendorf).

Distribution.—Mauritius, east coast of Africa, Indo-Pacific, Australia.

Remarks.—I have seen only one ♀ (size as given above) of this form.

Eriphia smithii McLeay

Figs. 37, *f*, 51.

1838. McLeay, Annulosa S. Afr., p. 60.

1843. Krauss, Südafr. Crust., p. 36, pl. 2, figs. 3, *a–e.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 797.

1894. Ortmann, Semon's Austral. Reise, v, p. 54.

1910. Stebbing, *l. c.*, p. 303.

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 382, pl. 59, figs. 1, 2.

1934. Gordon, Res. Sci. Ind. orient. Néerl., ii, fasc. 15, p. 52, fig. 29 (1st and 2nd plp. ♂).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 140, fig. 34, C, D (plp. 1, 2 ♂) (*sebana smithi*).

Probably only a variety of *laevimanus*, from which it is distinguished by having the wrist and hand of the smaller and usually also the larger cheliped covered with larger granules or conical tubercles. On the outer surface of hand of larger cheliped the granules are often less numerous and confined to the upper half, especially in large specimens; sometimes the wrist and hand of larger cheliped are almost smooth.

Length up to 47 mm., breadth 60 mm. Coloration as in *laevimanus*, large specimens with dorsal surface of carapace violaceous.

Localities.—Natal (Krauss, Miers, S. Afr. Mus.); Mozambique (Hilgendorf, Miers, S. Afr. Mus.); Isipingo and Durban (S. Afr. Mus.); Umhlali, Natal (coll. T. A. Stephenson); Port Elizabeth (Ortmann); Delagoa Bay (coll. van der Horst).

Distribution as for *laevimanus.*

Remarks.—Most authorities regard this form as a variety of *laevimanus*. All the South African specimens which I have seen have

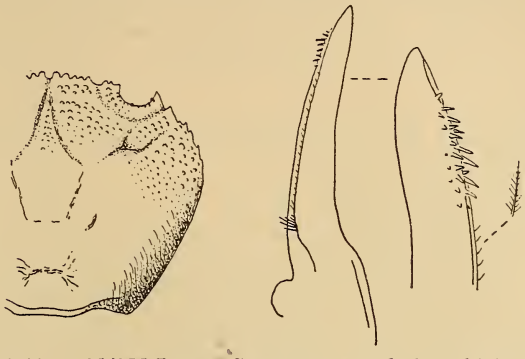


Fig. 51.—*Eriphia smithii* McLeay. Carapace, ventral view of left 1st pleopod ♂, and dorsal view of apex further enlarged.

either the one (the smaller) or both chelipeds definitely granulate and tuberculate, except the one specimen referred above to *laevimanus*.

It seems doubtful whether Ortmann's specimen came actually from Port Elizabeth.

Eriphia scabricula Dana

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 798.

1910. Stebbing, *l. c.*, p. 303.

1918. *Id.*, Ann. Durban Mus., ii, p. 53.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 156, pl. 80 (not good).

1942. Ward, Mauritius Inst. Bull., ii, p. 99, pl. 6, fig. 4 (subsp. *garciaensis*).

Front entire, only very finely or microscopically beaded. Carapace dorsally as in *laevimanus*, but with numerous hairs anteriorly and laterally. Wrists and hands of both chelipeds granulate and tuberculate, with numerous hairs.

Length 20 mm., breadth 30 mm. Reddish with yellow or yellowish-brown mottling, legs pale with reddish cross-bands (Krauss, Hilgendorf); reddish violet, bands on legs not conspicuous, finger and thumb of chelipeds dark (K. H. B.).

Localities.—Mouth of Umlaas River (Krauss); Durban (coll. K. H. B.); Mozambique (Hilgendorf, Miers); Impengazi, north of St. Lucia Bay (coll. T. A. Stephenson).

Distribution.—Mauritius, Indo-Pacific.

Remarks.—I have seen only four specimens: two collected by myself at the Cave Rock, Bluff, Durban, 1912, and two collected by Professor Stephenson in 1939. One of the latter is an ovigerous ♀, 10 mm. in length.

Gen. Trapezia Latr.

1898. Alcock, *l. c.*, p. 217.
1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 264.
1910. Stebbing, *l. c.*, p. 303.
1930. Rathbun, *l. c.*, p. 556.
1939. Ward, Amer. Mus. Novit., no. 1049, p. 12.

Carapace subquadrilateral, nearly as long as broad, not very convex, smooth, without trace of regions, antero-lateral margins subparallel, postero-lateral margins convergent, fronto-orbital margin nearly equal to width of carapace, front wide, 4-lobed (with the inner orbital angles appearing 6-lobed). Basal joint of ant. 2 very short, not nearly reaching front, whole antenna excluded from orbit by the meeting of the inner supra- and sub-orbital teeth, flagellum at least as long as orbit. Chelipeds subequal, long and strong, anterior margin of arm (4th joint) usually cristate and serrate, finger and thumb with sharp cutting-edges, tips pointed. Abdomen ♂ with 3rd–5th segments fused. Pleopod 2 ♂ short.

Remarks.—Inhabitants of coral-reefs.

Key to the South African Species.

I. A distinct spine or tooth in middle of lateral margin of carapace (fig. 52, *a*).
  A. Lower border of hand of chela sharp, entire.
    1. Outer surface of hand (and wrist) covered with tangled woolly hairs (fig. 52, *a*). Carapace and legs unicolorous . . . *cymodoce.*
    2. Outer surface of hand polished and glabrous.
      i. Carapace and legs unicolorous or with meshwork of fine brown lines . [*ferruginea*, Mauritius].
      ii. Carapace and legs with small red spots . *guttata.*
  B. Lower border of hand of chela granulate or bluntly serrulate. With red spots . . . . *rufopunctata.*
II. A mere notch or kink on lateral margin . . . *digitalis.*

Trapezia cymodoce (Herbst)

Fig. 52, *a*, *b*.

1838. McLeay, Annulosa S. Afr., p. 67, pl. 3 (*Grapsillus dentatus*).
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 798.

1910. Stebbing, *l. c.*, p. 304.

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 460, fig. 2.

1934. Boone, Bull. Vanderbilt Mar. Mus., p. 168, pl. 87.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 410.

1938. Gurney, Proc. Zool. Soc. Lond., ser. B, cviii, p. 76, pl. 2, figs. 23–28 (larval stage).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 161, fig. 42, C, D (plp. 1, 2 ♂).

A distinct spine or tooth in middle of lateral margin of carapace. Arm (4th joint) of cheliped with 6–7 teeth on anterior margin, lower margin of hand sharp, entire, outer surface of hand, and usually also of wrist, with a tangled mass of downy or woolly hairs.

Length up to 12 mm., breadth 14 mm. Smallest ovig. ♀ 5·5 mm. in length. Yellowish or reddish, portions of the carapace often darker or violaceous, but not spotted.

Localities.—San Juan de Nova and Europa Is., Mozambique Channel (Lenz); Isipingo, Natal (S. Afr. Mus.); Durban and Delagoa Bay (coll. K. H. B. 1912).

Distribution.—Ibo, Portuguese East Africa; Zanzibar; Red Sea; Indo-Pacific.

Trapezia guttata Rüppell

1830. Rüppell, Beschr. 24 Krabben, p. 27.

1842. Eydoux and Souleyet, Voy. Bonite, i, p. 232, pl. 2, fig. 4 (*tigrina*).

1898. Alcock, *l. c.*, p. 221 (*maculata*, non McLeay).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 865 (*maculatus*, non McLeay).

1939. Ward, Amer. Mus. Novit., no. 1049, p. 13, figs. 15, 16 (*tigrina*).

Differs from *cymodoce* in having shorter chelipeds, front margin of arm with 5 teeth, a stronger spine on inner angle of wrist, outer surface of hand (and wrist) hairless.

Length 9 mm., breadth 11 mm. Carapace, legs, chelipeds, and lower surface with numerous *small* round red spots on a paler ground-colour.

Locality.—Delagoa Bay (coll. K. H. B. 1912).

Distribution.—Andaman Is., Sandwich Is.

Remarks.—Only one ♀ and one juv. seen. In the juvenile, 3·5 mm. in length, the hand of the cheliped is hairy. The size and number of spots correspond with the figure in Eydoux and Souleyet.

Trapezia rufopunctata (Herbst)

1801. Herbst, Krabben and Krebse, iii, p. 54, pl. 47, fig. 6.

1838. McLeay, Annulosa S. Afr., p. 67 (*Grapsillus maculatus*).

1841. Eydoux and Souleyet, Voy. Bonite, i, p. 230, pl. 2, fig. 3 (*flavopunctata*).

1843. Krauss, Südafrik. Crust., p. 36.

1886. Miers, Rep. H.M.S. *Challenger*, xvii, p. 165.

1887. de Man, Arch. Naturg., liii, p. 318, pl. 13, figs. 1, 2 (*rufopunctata* and *maculata* Dana).

1894. Ortmann, Semon's Austral. Reise, v. p. 54.

1898. Alcock, *l. c.*, p. 222.

1910. Stebbing, *l. c.*, p. 304 (*maculata*).

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 166, pl. 86.

Distinguished by the granulate or bluntly serrulate lower border of hand.

Length 17 mm., breadth 18 mm. Carapace, chelipeds, and legs with rather *large* round red spots, or numerous *small* spots.

Locality.—"Cape of Good Hope" (McLeay); Delagoa Bay (coll. van der Horst and Lourenzo Marques Mus.).

Distribution.—East coast of Africa, Mauritius, Indo-Pacific.

Remarks.—From the photograph of McLeay's specimen sent me by Mr. Ward, it appears that Krauss' surmise that this was *rufopunctatus* was correct. The photograph shows traces of large spots on the cheliped, which has a serrulate lower border. Miers also referred McLeay's species to *rufopunctata*.

Trapezia digitalis Latr.

1825. Latreille, Encycl. Meth., x, p. 696.

1830. Rüppell, Beschr. 24 Krabben, p. 28 (*leucodactyla*).

1838. McLeay, Annulosa S. Afr., p. 67 (*Grapsillus subinteger*).

1898. Alcock, *l. c.*, p. 222.

1910. Stebbing, *l. c.*, p. 304 (*G. subinteger* under *ferruginea*).

1930. Rathbun, *l. c.*, p. 559, pl. 228, figs. 5, 6.

1942. Ward, Mauritius Inst. Bull., ii, p. 100 (*subinteger*).

At once distinguished by the absence of a tooth or spine on the lateral margin; in its place a mere notch or kink in the profile. Cheliped with arm shorter than in other species, broader than long, its anterior margin with 3 teeth (McLeay), lower border of hand sharp, outer surface glabrous.

Length 11 mm., breadth 13 mm. (McLeay's specimen, *fide* Ward).

Locality.—"Cape of Good Hope" (McLeay).

Distribution.—Red Sea, Indo-Pacific to California and Panama.

Remarks.—It seems strange that Alcock should have assigned McLeay's species to a species (*ferruginea*) with a definite tooth on the

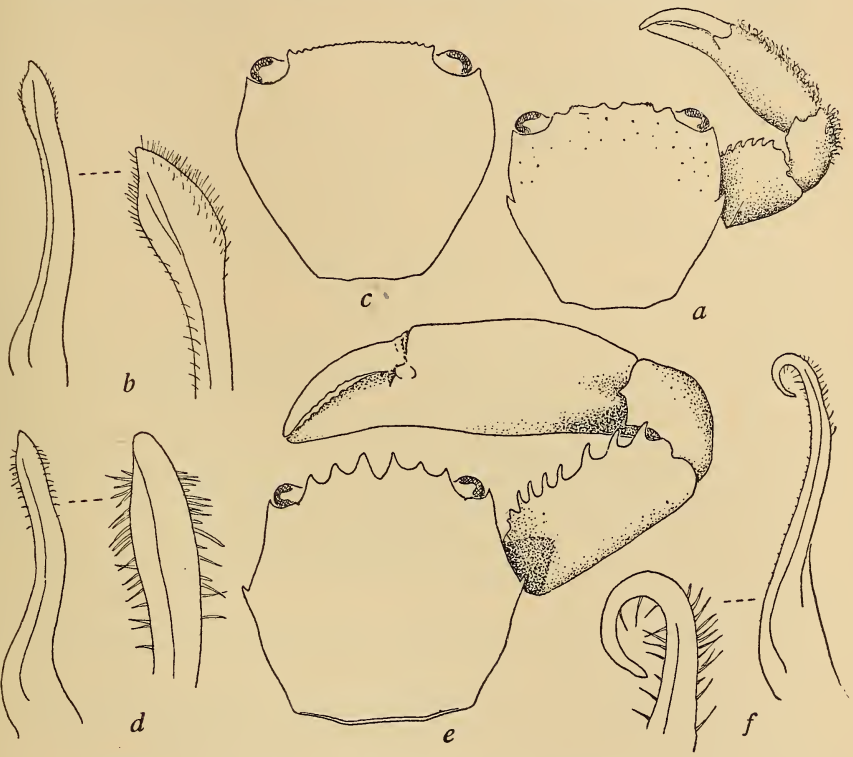


Fig. 52.—*Trapezia cymodoce* (Herbst). *a*, carapace, with cheliped. *b*, 1st pleopod ♂, with apex further enlarged.
Tetralia glaberrima (Herbst). *c*, carapace. *d*, 1st pleopod ♂, with apex further enlarged.
Quadrella coronata Dana. *e*, carapace, with cheliped. *f*, 1st pleopod ♂, with apex further enlarged.

lateral margin. The photograph of McLeay's specimen confirms the accuracy of McLeay's diagnosis: "thoracis lateribus versus vix emarginatus." Ward has compared Chagos material with McLeay's type, and maintains *subinteger* as a distinct species.

Gen. Tetralia Dana

1910. Stebbing, *l. c.*, p. 305.

Carapace similar to that of *Trapezia* but with the front straight or

slightly convex, finely denticulate and hardly separate from inner orbital angles, with lateral margins evenly convex. Basal joint of ant. 2 produced in a narrow process between upper and lower inner orbital angles, thus excluding flagellum from orbit. Chelipeds unequal. Legs stout. Abdomen ♂ with 7 distinct segments. Pleopod 2 ♂ short.

Remarks.—Inhabitants of coral reefs.

Tetralia glaberrima (Herbst)

Fig. 52, *c*, *d*.

1875. Paulson, Red Sea Crust., p. 51, pl. 7, fig. 7, pl. 9, figs. 1–1, *d* (*cavimana*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 798 (var. *nigrifrons* Dana).

1884. Miers, Zool. H.M.S. *Alert*, Crust., p. 537 (*cavimanus*).

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 265.

1910. Lenz, Voeltzkow Reise, ii, p. 553.

1910. Stebbing, *l. c.*, p. 505.

1924. *Id.*, Ann. S. Afr. Mus., xix, p. 1.

1934. Boone, Bull. Vanderbilt Mar. Mus., v, p. 174, pl. 89.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 411.

1938. Gurney, Proc. Zool. Soc. Lond., ser. B, cviii, p. 77, pl. 3, figs. 29–33 (larval stage).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 161, fig. 42, A, B (plp. 1, 2 ♂).

Carapace nitidulous. Arm of cheliped with anterior margin sharp, distally denticulate, more so in larger than in smaller cheliped, a fur-lined pit at base of outer upper surface of hand of larger cheliped. Ungues of legs short and stout.

Length 12 mm., breadth 13 mm. Pinkish red, often with a more or less conspicuous blackish bar across the front.

Localities.—Natal (Krauss); Europa Is., Mozambique Channel (Lenz); Mozambique (Stebbing); Delagoa Bay (S. Afr. Mus.).

Distribution.—Ibo, Portuguese East Africa; Red Sea; Seychelles; Indo-Pacific.

Gen. Quadrella Dana

1898. Alcock, *l. c.*, p. 225.

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., 1, p. 266.

1930. Rathbun, *l. c.*, 560.

Carapace subhexagonal, nearly as long as broad, smooth, without

trace of regions; fronto-orbital border nearly as wide as carapace, front cut into 4 spiniform teeth, the inner orbital angle similar in shape ("front" thus appearing 6-dentate); a short spine or tooth at junction of antero- and postero-lateral margins. Basal joint of ant. 2 very short, excluded from orbit by the meeting of the upper and lower inner orbital angles; the long flagellum, however, folds back in a small notch between the spiniform apices of the orbital angles. Chelipeds unequal, strong, elongate, the arm especially long, tips of finger and thumb pointed. Legs rather slender, dactyls serrate on lower margin. Abdomen ♂ with 3rd–5th segments fused. Pleopod 2 short.

Key to species: see Addenda.

Quadrella coronata Dana

Fig. 52, *e*, *f*.

1898. Alcock, *l. c.*, p. 226, with vars.

1902. Borradaile, *l. c.*, p. 266.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365.

Carapace smooth, but minutely shagreened and pitted (not highly polished like *Tetralia*); only one tooth on lateral margin. Anterior border of arm of chelipeds with 9–10 spiniform teeth; hand more or less covered with minute granulations.

Length 13 mm. (incl. frontal teeth), breadth 14 mm. Milky or pale pinkish.

Locality.—Durban, washed up on ocean beach (S. Afr. Mus.).

Distribution.—Seychelles and Indian Seas, to 88 fathoms.

Remarks.—*Q. cyrenae* Ward (1942, Mauritius Inst. Bull., ii, p. 45, pl. 3, figs. 5, 6) from Mauritius is probably to be regarded as a variety.

Family GONEPLACIDAE.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 482, 485.

1910. Stebbing, *l. c.*, p. 312.

1918. Rathbun, Bull. U.S. Nat. Mus., no. 97, p. 15 (January).

1918. Tesch, Siboga Exp. monogr., xxxix, *c*, pp. 152–243 (August).

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 265.

Carapace usually subquadrilateral. Orbits complete, often elongate. 5th joint of mxp. 3 inserted at or near antero-internal angle of 4th joint. 1st antennae folding obliquely or transversely (figs. 53, 54). Genital openings in ♂ sternal, or if coxal the membranous external prolongations of the vasa deferentia pass along

grooves protected by the penultimate sternal plate (in *Goneplax*, etc., but not in *Pilumnoplax heterochir*).

Remarks.—Not sharply separated from the *Xanthidae* (Borradaile, *l. c.*, p. 482; Tesch, *l. c.*, p. 153).

Key to the South African Genera.

I. Fifth pair of legs present.
- A. Genital openings of ♂ coxal. Eyes movable.
  - 1. Fronto-orbital margin forming the greatest, or nearly the greatest, width of carapace (fig. 53, *a*, *b*).
    - *a*. Eyes not projecting beyond the forwardly directed outer orbital angle. No stridulating ridge on pterygostomial region . . . . . *Goneplax.*
    - *b*. Eyes projecting beyond the laterally directed outer orbital angle. A stridulating ridge on pterygostomial region . . . . . *Ommatocarcinus.*
  - 2. Fronto-orbital margin not nearly equal to greatest width of carapace, lateral margins more or less convex (figs. 53, *g*, 54, *a*, *d*, *f*).
    - *a*. 3rd abdominal segment ♂ covers whole sternum between 5th coxae.
      - i. Flagellum of ant. 2 in the orbit (fig. 54, *b*).
        - *α*. Front straight (or slightly concave).
          - * Lateral border of carapace strongly convex, without definite teeth (except in juvenile) . *Carcinoplax.*
          - ** Lateral border nearly straight, with definite teeth . . . *Pilumnoplax.*
        - *β*. Front usually 4-dentate, if straight then only one antero-lateral tooth behind outer orbital angle . . *Geryon.*
        - *γ*. Front bilobed, with long bristles . *Litocheira.*
      - ii. Flagellum of ant. 2 excluded from orbit by a process of basal joint (fig. 54, *e*) . . . . . *Eucrate.*
    - *b*. 3rd abdominal segment ♂ not covering whole sternum between 5th coxae . [*Euryplax*].
- B. Genital openings ♂ sternal. Eyes immovable, often reduced. 3rd abdominal segment ♂ not covering whole sternum between 5th coxae . . . *Xenophthalmodes.*

II. Fifth pair of legs absent. Genital openings ♂ sternal.
A. 6th joint of mxp. 3 cylindrical . . . . *Hexapus.*
B. 6th joint of mxp. 3 distally expanded and produced . *Thaumastoplax.*

The genus *Euryplax* is an American (Atlantic and Pacific coasts) genus, and further and better evidence for its occurrence in South Africa than Stebbing's record (*Euryplax bevisi* Stebb. 1921, Ann. Durban Mus., iii, p. 15, pl. 2) is required. Stebbing's figure reminds one very much of a *Thalamita*, but the shape of the 6th abdominal segment is against this interpretation. Stebbing says nothing about the legs, particularly the 5th leg. Perhaps the nearest approach is Rathbun's *Pilumnoplax acanthomerus* (1911, Trans. Linn. Soc. Lond., xiv, p. 237, pl. 18, fig. 13) from the Amirante Is.

Gen. Goneplax Leach

1910. Stebbing, *l. c.*, p. 312.
1918. Rathbun, *l. c.*, p. 25.
1918. Tesch, *l. c.*, p. 181.

Carapace broader than long, subquadrilateral, antero-lateral angles acute, lateral borders convergent behind; front and orbits occupying whole anterior width of carapace. Eye-stalks moderately long and slender. Chelipeds much longer in adult ♂ than in ♀ and juv., in both sexes stronger than the slender legs. Abdomen in both sexes with 7 segments; in ♂ 3rd segment widest, usually reaching coxae of 5th legs, 1st and 2nd segments not reaching the coxae leaving a portion of the sternum uncovered; in ♀ broadly oval, covering the sternum. Genital openings ♀ extraordinarily large. In ♂ external continuation of vas deferens from the coxal opening runs in a groove protected by the penultimate sternal plate. Pleopod 2 ♂ as long as pleopod 1. No stridulating organ.

Goneplax angulata (Pennant)

Fig. 53, *a*. *Cf.* also fig. 53, *f*.

1910. Stebbing, *l. c.*, p. 312.
1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 264.
1923. Odhner, Medd. Göteb. Mus., xxxi, p. 26.

Carapace with sharp spine-tooth on lateral margin behind the rather blunt outer orbital tooth; front square-cut, width about ¼ greatest width of carapace, anterior margin straight or slightly concave, the thickened costate margin widened at the inner orbital border; ptery-

gostomial ridge finely and closely granulate. Cheliped, 4th joint with a spine-tooth in distal third of upper margin, a denticle (♂) or strong spine (♀) on inner side, and a smaller denticle on outer side, of wrist; right hand in adult ♂ more massive than left, finger and thumb

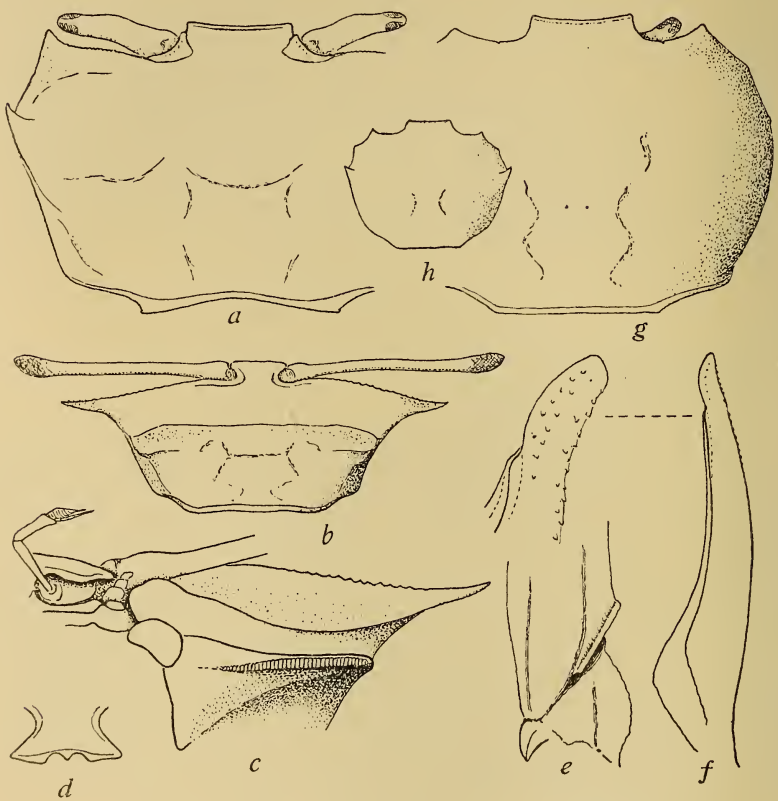


Fig. 53.—*Goneplax angulata* (Pennant). *a*, carapace. *Ommatocarcinus pulcher* n. sp. *b*, carapace. *c*, ventral view of pterygostomial region showing stridulating ridge. *d*, front. *e*, base of 4th joint of cheliped showing stridulating ridge. *f*, 1st pleopod ♂, with apex further enlarged. *Carcinoplax longimanus* (de Haan). *g*, carapace of adult. *h*, carapace of juvenile.

stronger and widely gaping at base. Fourth joint of all legs with subapical spine on upper margin, 6th joint fringed on upper and lower margins, 6th joint of 5th leg not expanded, dactyls fringed on front and hind margins, stronger on front margin, dactyl of 2nd leg evenly tapering, of 3rd–5th legs widest in its distal third. Pleopod 1 ♂ nearly straight, scabrous on dorsal and other surfaces, and also slightly on ventral surface distally (*cf.* fig. 53, *f*).

Length up to 27 mm., breadth 45 mm., cheliped ♂ 135 mm., ♀ 55 mm. Pale pink, or salmon, or pinky-cream, carapace and chelipeds more or less vermiculate or mottled.

Localities.—Off Cape St. Blaize (Stebbing); Agulhas Bank and Algoa Bay, 40–117 metres (Doflein); Agulhas Bank, 61–72 metres (Odhner); Dassen Island, 35 fathoms (Stebbing); Table Bay, and False Bay to East London, 15–60 fathoms (S. Afr. Mus.).

Distribution.—North Atlantic south to Gulf of Cadiz, Mediterranean.

Remarks.—Although the South African Museum had specimens from Table Bay in 1887, the species was not actually recorded from the Cape until 1902 (Stebbing); according to the collection of the s.s. *Pieter Faure* it is one of the commonest crabs on the Agulhas Bank.

There is apparently a big gap in its distribution between the Gulf of Cadiz and the Mediterranean on the one hand, and the Cape on the other hand. The possibility of transportation by ship is rather remote, as this is not a clinging rock-crab (such as is *Plagusia*) but a sand-burrower.

Among the very numerous specimens examined not one shows any approach to the Mediterranean *rhomboides*, in which the lateral spine behind the outer orbital tooth is reduced to a mere knob or a very slight swelling.

Gen. Ommatocarcinus White

1852. White, Append. in Stanley's Voy. H.M.S. *Rattlesnake*, ii, p. 393.

1885. Filhol, Mission île Campbell, Rec. Mem. Ac. Sc. Paris, iii, p. 384.

1918. Tesch, *l. c.*, p. 186.

1929. Chilton and Bennett, Trans. N. Zeal. Inst., lix (1928), p. 757.

1933. Yokoya, J. Coll. Agric. Tokyo Univ., xii, p. 198.

Close to *Goneplax*, but the outer orbital tooth forms a spine directed laterally, behind which the lateral margins are concave and strongly convergent; no epibranchial tooth; front constricted at base; a stridulating ridge on pterygostomial region with an opposing ridge on base of 4th joint of cheliped (? in all species); antenna 2 very short; eye-stalk very long, the cornea extending beyond outer orbital spine. Penultimate sternal plate in ♂ as in *Goneplax*.

Distribution.—Australia, New Zealand, and Malay Archipelago.

Ommatocarcinus pulcher n. sp.

Fig. 53, *b–f.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365 (*Ommatocarcinus* sp.).

Carapace convex longitudinally, with a transverse ridge extending from side to side, upper orbital margin feebly crenulate, outer orbital spine granulate, a milled ridge across the pterygostomial region stridulating. Antenna 2 very small, 3-jointed (on both sides, and flagellum also apparently absent). Cheliped (♂) elongate, 4th joint triquetral, all three surfaces flat and distinctly delimited by the blunt but angular edges; a smooth ridge at base on upper surface opposing the stridulating ridge on pterygostomial region, but otherwise without any spines or denticles; wrist rounded externally, with a small denticle internally; hand like that of *G. angulata*, the right slightly larger than left, finger and thumb gaping at base. Fourth joint of legs fusiform, twice as broad in middle as at either end, no subapical spine on upper margin, dactyls with subparallel margins or evenly tapering. Abdomen as in *G. angulata*, 1st segment more or less concealed, 2nd not quite concealing all the sternal surface, 3rd widest and almost meeting coxae of 5th legs, following segments evenly tapering. Pleopods 1 and 2 as in *G. angulata*.

Length 15 mm., breadth (incl. lateral spines) 37 mm., hind margin of carapace between bases of 5th coxae 12 mm., cheliped (♂) 70 mm. As preserved pale pinkish with indications of darker spots on upper surfaces of hands and fingers of chelipeds.

Locality.—Natal coast, from stomach of fish (S. Afr. Mus. 1 ♂).

Remarks.—This beautiful specimen was obtained in January 1933. The stridulating ridge appears similar to that in *Trizocarcinus* (Rathbun, *l. c.*, 1918, p. 17, fig. 3). *O. orientalis* Tesch 1918 appears to be a juvenile.

Gen. Carcinoplax M. Edw.

1910. Stebbing, *l. c.*, p. 313.

1918. Tesch, *l. c.*, p. 154 (list of species only).

Carapace broader than long, convex, regions not defined, lateral margin arched, front straight, distance between outer orbital teeth considerably less than maximum width of carapace. Flagellum of ant. 2 not excluded from orbit. Eye-stalks short, stout, Chelipeds in ♂ usually much longer than in ♀. Legs slender, unarmed, with

fringes of setae, 6th joint and dactyl of 5th leg compressed and somewhat widened. Abdomen with 7 distinct segments in ♂, 2nd and 3rd segments occupying whole width between 5th coxae. Genital openings in adult ♀ very large. Penultimate sternal plate forming a protective covering to the external genital duct in ♂. Pleopod 2 ♂ as long as pleopod 1.

Remarks.—Considerable growth-changes take place in the shape of the carapace and chelipeds (Alcock, 1900, p. 303. Doflein, 1904, pp. 114–117). Thus it would seem doubtful whether all the seven species described from one area by Rathbun in 1914 are valid.

Key to the South African Species.

1. Carapace glabrous . . . . . *longimanus.*
2. Carapace covered with soft thick fur . . . . *vestita.*

Carcinoplax longimanus (de Haan)

Fig. 53, *g*, *h*.

1904. Doflein, D. Tiefsee Exp., vi, p. 114, pl. 35, figs. 1, 2, pl. 36 (subsp. *indicus* and *japonicus*).

1910. Stebbing, *l. c.*, p. 313.

1923. *Id.*, Fish. Mar. Biol. Surv., Rep. iii (for 1922), Spec. Rep. 3, p. 3.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

Carapace ovoid, finely granulate, glabrous, antero-lateral margin with 2 slight knobs or indications of teeth behind outer orbital tooth in adult, in juv. 12–19 mm. in length the hinder of these knobs is sharp and dentiform. Orbit about $\frac{2}{3}$ width of front. A granulate ridge across pterygostomial region (but this is not a stridulating ridge). Cheliped, 4th joint with a spine (or tooth or tubercle) in distal third of upper margin, wrist with a spine or tooth on both outer and inner margins, the latter the stronger and usually curving uncinately forwards, hand with a prominent rounded smooth knob at base dorsally, and a blunt ridge ending in a knob (blunt or dentiform) on middle of inner surface, more pronounced in adult ♂. Margins of legs fringed with setae, especially 5th and 6th joints and dactyl of 5th leg. Pleopod 1 ♂ as in *G. angulata* and *O. pulcher*.

Length up to ♂ 50 mm., ♀ 40 mm., breadth ♂ 64, ♀ 50 mm., cheliped ♂ 215, ♀ 80 mm. Smallest specimen examined 12 × 16 mm. (incl. lateral spines). Buff or pale salmon.

Localities.—Off Kowie, 40 fathoms (Stebbing); Natal, 130 fathoms (Stebbing); Portuguese East Africa (25° 17′ S., 33° 29′ E.) 117 metres (Barnard); Algoa Bay to off Tugela River mouth, 40–63 fathoms, mostly on muddy bottom (S. Afr. Mus.).

Distribution.—Japan, Andaman Is., Burma, Nicobar Is.

Remarks.—In view of the growth-changes, the institution of a subspecific name (*indicus* Doflein, 1904) seems scarcely necessary.

During the course of the s.s. *Pieter Faure* investigations this crab became known to the crew as the Kowie Crab. About 50 specimens were obtained on the trawling grounds between Algoa Bay and the Kowie.

Carcinoplax vestita (de Haan)

1910. Stebbing, *l. c.*, p. 313 (*Pilumnoplax v.*, part references).

1918. Tesch, *l. c.*, pp. 155, 156 (*Pilumnoplax v.*).

1932. Shen, Zool. Sinica, ix, p. 110, figs. 63–65, and pl. 5, fig. 1.

[Not *Curtonotus vestitus* McLeay.]

Carapace covered with fine dense fur, oval, antero-lateral margin with 2 small denticles, usually concealed in the fur. Pterygostomial region with ridge (not stridulating). Chelipeds not greatly elongate in ♂, furry, wrist with a tooth on both outer and inner margins, inner surface of hand bare, smooth and turgid in middle. Legs slender, setose.

Length ♂ 18, ♀ 22 mm., breadth ♂ 26, ♀ 29 mm. (Shen). Salmon-coloured with brownish fur.

Locality.—Natal (Krauss) (sed ?).

Distribution.—Japan, China, Australia.

Remarks.—The shape of the carapace seems to indicate more affinity to *Carcinoplax* than to the species of *Pilumnoplax.*

McLeay's "*Curtonotus vestitus*" is not this species but *Pilumnus longicornis* (p. 265); and it is very likely that Krauss' record also refers to the latter.

Gen. Pilumnoplax Stimpson

1910. Stebbing, *l. c.*, p. 313.

1918. Rathbun, *l. c.*, p. 21.

1918. Tesch, *l. c.*, p. 154 (key to species).

Carapace depressed, flat, a little broader than long, more or less hexagonal, regions faintly indicated; front straight, antero-lateral margin oblique, toothed. Supra-orbital margin with 1 or 2 furrows. Chelipeds more or less unequal. Legs slender. Abdomen with 7

segments, 1st–3rd in ♂ covering whole sternal width between 5th coxae. Hind margin of penultimate sternal plate not projecting to form a protective covering to the external genital duct in ♂. Genital openings in ♀ not large. Pleopod 2 ♂ elongate, very slender.

Pilumnoplax heterochir (Studer)

Fig. 54, *a–c.*

1910. Stebbing, *l. c.*, p. 314.
1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 265.
1918. Tesch, *l. c.*, p. 156 (in key).
1923. Rathbun, Biol. Res. "Endeavour," v, p. 99, pl. 17, figs. 1, 2.

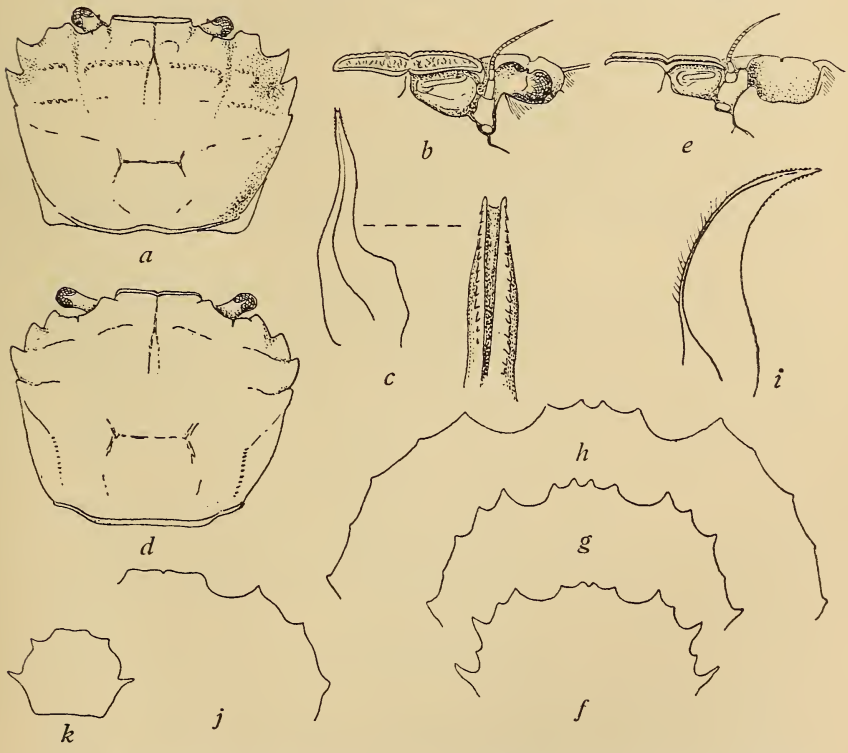


Fig. 54.—*Pilumnoplax heterochir* (Studer). *a*, carapace. *b*, ventral view of front. *c*, 1st pleopod ♂, with apex further enlarged.
Eucrate sulcatifrons (Stmpsn.). *d*, carapace. *e*, ventral view of front.
Geryon quinquedens S. I. Smith. *f*, *g*, *h*, anterior profile of carapace of specimens 19 × 27, 52 × 63, and 85 × 100 mm. in size respectively. *i*, 1st pleopod ♂ (apical scabrosities exaggerated).
Geryon trispinosus (Herbst). *j*, anterior profile of specimen *ca.* 70 × 90 mm. (after de Man).
Geryon ischurodous Stebb. *k*, outline of specimen 16 × 26 mm. (after Stebbing).

Carapace glabrous, minutely shagreened, larger granules on the transverse ridges, frontal and orbital margins more or less beaded, front nearly vertically truncate, inner orbital tooth almost obsolete, 2 very slight supraorbital fissures (the outer one often obsolete), outer orbital tooth truncate or sometimes feebly bilobed, 2 well-developed antero-lateral teeth behind outer orbital tooth, with a very minute and often obscure third tooth. No pterygostomial ridge. A row of 3–4 granules on anterior surface of eye-stalk near cornea. Chelipeds, wrist with 2 teeth on inner margin near base, the larger (usually the right) cheliped with wrist, hand, finger and thumb smooth, except a few granules on outer surface of wrist and at base of outer surface of hand (these granules more conspicuous in juv.); the smaller cheliped with wrist and hand strongly granulate, finger and thumb grooved and ridged. Legs, 4th–6th joints more or less granulate on upper margins, dactyls terete, distal joints sparsely setose. Terminal abdominal segment ♂ much wider than long, apically rounded.

Length up to 14 mm., breadth 20 mm., ♀ slightly smaller than ♂; smallest ovig. ♀ 6·5 × 8·5 mm.; smallest specimen examined 4 × 6 mm. Orange-red, fingers and thumbs of chelipeds black (persistent in alcohol).

Localities.—34° 13′ S., 15° E., 117 fathoms (Studer); 35° 4′ S., 18° 37′ E., 150 fathoms (Miers); southern slopes of Agulhas Bank and off Cape Point, 155–500 metres (Doflein); off Cape Point, and along south-eastern slopes of Agulhas Bank as far east as East London, 100–320 fathoms (S. Afr. Mus.).

Distribution.—Atlantic Ocean: Tristan d'Acunha, 100 fathoms, and Gough Is., 75–100 fathoms.
Indian Ocean: St. Paul, 672 metres, and New Amsterdam, 496 metres.
South Australia and Tasmania, 127–270 fathoms.

Gen. Geryon Kröyer

1910. Stebbing, *l. c.*, p. 313.
1922. Bouvier, Res. Sci. Camp. Monaco., fasc. lxii, p. 68.
1937. Rathbun, *l. c.*, p. 265.

Carapace subquadrilateral, very little broader than long, regions obscurely defined, frontal and antero-lateral margins usually dentate; inner angle of lower border of orbit usually prominent. Basal joint of ant. 2 movable, flagellum not excluded from orbit. Chelipeds subequal, strong. Legs strong, dactyls bare. Abdomen with 7

segments in both sexes, completely covering sternum between 5th coxae, 3rd segment wider than 1st and 2nd, abruptly so in ♂. Genital openings in ♂ coxal; in ♀ not enlarged. Pleopod 2 ♂ nearly as long as pleopod 1.

Remarks.—A genus of deep-water crabs (with the exception possibly of *trispinosus* and *ischurodous*), which has been assigned to different families by various authors (see Stebbing, 1905, p. 35). Doflein (1904, pp. viii, ix, and 105) placed it along with freshwater crabs in the family *Potamonidae*.

Key to the South African Species.

1. Antero-lateral margin with 5 teeth . . . . . *quinquedens.*
2. Antero-lateral margin with 2 teeth . . . . . *ischurodous.*

Geryon quinquedens S. I. Smith

Fig. 54, *f–i.*

1894. Milne Edwards and Bouvier, Res. Sci. Camp. Monaco, fasc. vii, p. 41, figs. A, C, and pl. 1, fig. 1 (*affinis*).

1899. *Id.*, *ibid.*, fasc. xiii, p. 35 (*affinis*).

1904. Doflein, D. Tiefsee Exp., vi, p. 106, pls. 3, 4, 33, 34, 38, figs. 1–6; 41, figs. 3–7; 43, figs. 2, 8, and p. 273, fig. 62 (distribution) (*affinis*).

1904. *Id.*, *ibid.*, p. 112, pl. 31, figs. 1, 2 (*paulensis*, = juv.).

1910. Stebbing, *l. c.*, p. 313.

1922. Bouvier, *l. c.*, p. 70, pl. 6, fig. 7, and p. 70 (*affinis*).

1937. Rathbun, *l. c.*, p. 271, pls. 85, 86.

Carapace dorsally somewhat uneven, smooth but becoming granulate in adult, especially on the cardiac, intestinal, and hinder branchial regions; front quadridentate, the 2 inner teeth rather close together, the outer ones forming the inner orbital angles, orbit about $\frac{3}{4}$ width of front, antero-lateral margin with 5 teeth or denticles (incl. outer orbital tooth), 2nd and 4th teeth always smaller than the others, 3rd and 5th in juv. prominent, almost spiniform (*paulensis*), becoming blunt and obscure in old examples; postero-lateral margin longer than antero-lateral, nearly straight. Chelipeds, a strong spine (relatively stronger in juv. than in adult) on inner margin of wrist, upper surface of wrist and all surfaces of hand granulose-squamulose, both finger and thumb with a line of deep pits along both inner and outer surfaces. Legs, anterior margin of 4th–6th joints more or less strongly

denticulate or spinulose-granulose, dactyls slender, upper and ventral surfaces grooved, or with a line of pits. Abdomen ♂ from 3rd segment onwards triangular with nearly straight sides, 3rd–5th segments with a tendency to coalesce, but the sutures remaining distinct, 1st–3rd transversely ridged (bluntly). Pleopod 1 ♂ stout, falcate, apically acute and very minutely scabrous; pleopod 2 slender, almost as long as 1st.

Length up to 125 mm., breadth 140 mm. (130 × 152 mm., S. I. Smith). Smallest specimen examined 10 × 14 mm. (incl. spines, 11 mm. excl. spines). Brownish- or russet-red.

Localities.—Off Cape Point, 470 fathoms (Stebbing); off Cape Point, 250–760 fathoms, and off East London, 300 fathoms (S. Afr. Mus.).

Distribution.—*quinquedens*: Azores, and east coast of North America, also (*fide* Doflein, fig. 62, chart) east coast of South America.

affinis: Azores, Cape Verdes, South Atlantic (25° 27′ S., 6° 8′ E.), off east coast of Africa, Indian Seas.

paulensis: Southern Indian Ocean (30° 6′ S., 87° 50′ E.).

Remarks.—There is no question that *paulensis* represents the young form; even the very small series in the South African Museum indicates as much; on one occasion adults and juveniles were taken in the same haul.

Also both Doflein and Bouvier were disposed to make *affinis* a synonym of *quinquedens*, but apparently considered the difference in the dactyls of 2nd–5th legs to be constant. The small series in the South African Museum, however, shows that this is not constant, or at least that both forms occur in the same locality. In some specimens the upper and lower surfaces of the dactyls are quite flat, with a longitudinal row of pits; in others there is a shallow but distinct longitudinal depression or groove; and in others a definite groove bordered on each side by a ridge (*affinis*, M. Edw. and Bouvier, 1894, text-fig. A).

Geryon ischurodous Stebb.

Fig. 54, *k*.

1923. Stebbing, Fish. Mar. Biol. Surv., Rep. iii (for 1922), Spec. Rep. 3, p. 2, pl. xi.

Carapace with only 2 teeth (incl. outer orbital tooth) on antero-

lateral margin, the margin between them sigmoidally curved; front "smooth," its central point (*sic*) not visible in dorsal view; straight according to figure, without indication of median notch, or a pair of denticles, and inner orbital angle bluntly rounded. Cheliped, 4th joint with small tooth near base, and a strong one on (middle of) inner margin, wrist with small tooth on outer, and a large bidentate tooth on inner margin. Legs smooth, dactyls subequal to 6th joints.

Length 16 mm., breadth 26 mm.

Locality.—Durban, from coral washed up on beach (Stebbing).

Remarks.—Although not referred to by Stebbing, there is an obvious similarity between this specimen and *trispinosus* (Herbst) (see de Man, 1890, Notes Leyden Mus., xii, p. 69, pl. 4, fig. 6, and Ortmann, 1894, Zool. Jahrb., vii, p. 685), from the East Indies and Japan. The front is nearly straight, with a slight median notch between 2 very blunt lobules (scarcely teeth), and rounded inner orbital angles. The antero-lateral margin has 3 teeth (incl. outer orbital tooth). de Man says of Herbst's type specimen: "the lateral margin is quite straight between the 1st and 2nd teeth, slightly convex between the 2nd and 3rd," and "the anterior margin of the 3rd tooth forms almost a right angle with the lateral margin"; a description which fits Stebbing's figure, barring the absence in the latter of the intervening (2nd) denticle.

de Man gives the size of Herbst's type as $76\frac{1}{2} \times 99$ mm.

There seems little doubt that *ischurodous* should become a synonym of *trispinosus*.

Gen. Litocheira Kinahan

1910. Stebbing, *l.c.*, p. 314.

1918. Tesch, *l. c.*, p. 163 (key to species).

1933. Balss, Capita Zool., iv, p. 43.

Carapace rather deep, dorsally convex, squarish, regions ill-defined; front with free edge, somewhat deflexed, convex, more or less bilobed; antero-lateral margin straight. Flagellum of ant. 2 not excluded from orbit. Eye-stalk short, stout. Chelipeds slightly unequal. Abdomen of 7 segments, but in the South African species segments 3–6 are more or less completely fused and move as one piece, segments 1–3 in ♂ covering whole space between 5th coxae. Hind margin of penultimate sternal plate strongly projecting, so that genital opening appears to be sternal. Pleopod 2 ♂ very short, only just entering base of groove in 1st pleopod. Genital opening ♀ not large.

Remarks.—Balss has suggested that several of the species placed in

this genus by Tesch and other authors are more properly placed in other genera, chiefly *Heteropilumnus* (*Xanthidae*). The typical species of *Litocheira* has well-developed endostomial ridges (not so in *Heteropilumnus*).

Carapace and legs in the South African species with outstanding bristly hairs.

Litocheira kingsleyi (Miers)

Fig. 55.

1910. Stebbing, *l. c.*, p. 314, and p. 320 ("*Planes minutus*" part: the specimen no. 15070).

1918. Tesch, *l. c.*, p. 164 (in key).

1933. Balss, *l. c.*, p. 44.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 365.

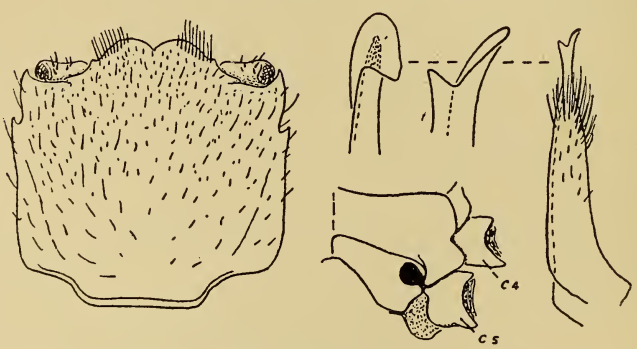


Fig. 55.—*Litocheira kingsleyi* (Miers). Carapace; 4th and 5th sternites with genital opening ♂; *c*4, *c*5 = 4th and 5th coxae; 1st pleopod ♂, with apex in ventral, and inner (median) views further enlarged.

Carapace setose, square, length and breadth subequal, front distinctly bilobed in dorsal view, inner orbital tooth small, supra-orbital margin without a fissure, but the beaded margin is interrupted by a shallow oblique groove, outer orbital tooth prominent, acute, one acute spiniform tooth on lateral margin. No pterygostomial ridge. Eye-stalk setose. Basal joint of ant. 2 movable. Chelipeds, lower front margin of 4th joint serrulate, wrist and hand granulate. Legs, 4th joint with a single subapical spine on upper margin, dactyls compressed, with a double row of strong spine-setae on lower margin, the subapical pair being as strong as, or even stronger than, the unguis; all joints with scattered outstanding bristle-hairs.

Length and breadth up to 13 mm. Yellowish, the hairs amber-coloured.

Localities.—35° 4′ S., 18° 37′ E., 150 fathoms (Miers); 34° 33′ S., 18° 21′ E., 318 metres (Doflein); 38 miles N.W. of Table Bay (Stebbing, as "*Planes minutus*"); N.W. of Table Bay, off Cape Point, south-eastern slope of Agulhas Bank off East London, 95–300 fathoms (S. Afr. Mus.); Algoa Bay (Port Elizabeth Mus.).

Remarks.—Stebbing's identification and record of a specimen of this species as *Planes minutus* was evidently an accidental slip.

Gen. Eucrate de Haan

1918. Tesch, *l. c.*, p. 157 (key to species).

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 238 (Feb.).

1920. *Id.*, Ann. Durban Mus., ii, p. 268 (Aug.).

Carapace a little broader than long, smooth or with feeble ridges, regions ill-defined; front straight; antero-lateral margin convex, toothed, postero-lateral margins convergent. Flagellum of ant. 2 completely excluded from orbit by a process of basal joint. Eye-stalk short, stout. Chelipeds robust, slightly unequal. Legs unarmed, dactyls slender; 6th joint and dactyl of 5th leg often slightly enlarged. Abdomen with 7 segments in both sexes, 3rd segment in ♂ covering whole sternal width between 5th coxae. Genital openings ♀ not large. Pleopod 2 ♂ ?.

Eucrate sulcatifrons (Stimpson)

Fig. 54, *d*, *e*.

1902. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 243, fig. 45 (*Pseudozius* (*Platyozius*) *laevis*).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, p. 861, pl. xi, fig. 7 (*Platyozius laevis*).

1918. Tesch, *l. c.*, p. 158 (references and synonymy).

1920. Stebbing, *l. c.*, p. 238 (*affinis*).

1920. *Id.*, *l. c.*, p. 268.

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 458, pl. 15 (Crust., pl. 110) (*affinis*).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 167, fig. 45, A, B (plp. 1, 2 ♂).

Carapace nearly smooth or with low transverse ridges running from the last, and sometimes also the 2nd, antero-lateral tooth; sometimes

a more or less distinct beaded ridge nearly parallel with the postero-lateral margin; front notched in middle, free edge sulcate; inner orbital tooth not prominent, squarish, a feeble notch in middle of supra-orbital margin; antero-lateral margin with 4 teeth (incl. outer orbital tooth), the 4th one the smallest. Cheliped, one or two teeth on upper inner margin of 4th joint, a blunt tooth on inner margin of wrist, wrist and hand smooth or nearly so, distal end of wrist more or less covered with thick fur, an impressed line or groove near lower margin of thumb. Last 3 joints of legs more or less setose, the 6th joint and dactyl of 5th leg slightly broader than those of the other legs, dactyl with stronger spines, as well as the fringe of setae.

Length up to 12 mm., breadth 15 mm.

Localities.—Off Port Shepstone, Natal, 24 fathoms, and Durban (Stebbing).

Distribution.—Indian Seas, Andaman Is., Mergui Archipelago, to China, Australia and Hawaiian Is.

Remarks.—Tesch decides to maintain this form as a species separate from the Japanese *crenata* de Haan on the grounds that Indian specimens are constantly smaller than Japanese, slightly more sculptured, and have the wrist of the cheliped less furry.

No examination of the 1st pleopod ♂ seems to have been made, even by Shen (1932, Zool. Sinica, ix, p. 116, fig. 67, *crenata*). Unfortunately the ♂ specimen mentioned by Stebbing (1921) was not returned to the South African Museum. But see Stephensen, 1945.

Gen. Xenophthalmodes Richters

1880. Richters, Beitr. Meeresf. Mauritius, p. 155.
1890. de Man, Notes Leyden Mus., xii, p. 68.
1900. Alcock, J. Asiat. Soc. Bengal, lxix, p. 323.
1918. Tesch, *l. c.*, pp. 202 (in key), 215.

Carapace subsemicircular, widest posteriorly across hind margin, front moderately wide, more or less bilobed, orbits small. Eye-stalks immovable, very short, stout, cornea obsolete or nearly so (in adult, distinct in juv.). Chelipeds equal or unequal, hand compressed. Dactyls successively decreasing on 2nd to 5th legs. Abdomen with 7 segments in both sexes, in ♂ 2nd segment much narrower than either 1st or 3rd, neither of which cover whole space between 5th coxae. Pleopod 1 ♂ sometimes very long, extending beyond 7th abdominal segment.

Xenophthalmodes moebii Richters

Fig. 56, *a–c.*

1880. Richters, *l. c.*, p. 155, pl. 16, fig. 29, pl. 17, figs. 1–5.
1890. de Man, *l. c.*, p. 68, pl. 3, fig. 5.
1900. Alcock, *l. c.*, p. 324.
1918. Tesch, *l. c.*, pp. 215, 216.
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*Typhlocarcinus rubidus*, non Alcock).
1947. *Id.*, Ann. Mag. Nat. Hist. (xi), 13, p. 366.

Carapace smooth except for 2 crescentic impressions, minutely granulate near antero-lateral and lateral margins, bare except for some rather longish and matted hairs on antero-lateral margins (pile, if it was present, is now worn off the single specimen examined); front distinctly bilobed. Free edge of epistome thin, prominent, with slight median groove. Maxilliped 3 with 4th joint slightly narrower than 3rd, its lateral and anterior margins forming an even curve (shape of 3rd joint as in de Man's figure, not as in Tesch's, *i.e.* the inner margin proximally slopes away to the point of attachment at outer corner), 3rd joint longitudinally grooved, 3rd and 4th and exopod minutely granulate. Chelipeds unequal, left larger than right, wrist angular (but not prominently so) on inner margin in right cheliped, distinctly dentiform in left, upper surface smooth and polished, but minutely granulate around margins, and probably setose in life, hand with sharp granulate upper and lower margins (probably setose in life), inner and outer surfaces smooth, finger with longitudinal setose groove on outer surface, apices of finger and thumb acute, crossed when closed. Legs unarmed, setose, dactyls terete, acuminate. Abdomen as figured for *dolichophallus* by Tesch. Sternite between the chelipeds minutely granular along border of the median groove. Pleopod 1 ♂ straight, slender, very long, projecting beyond 7th abdominal segment almost to the buccal cavity.

Length 6 mm., breadth 8 mm. Dirty whitish.

Locality.—Delagoa Bay (Barnard).

Distribution.—*moebii*: Mauritius, Red Sea, Persian Gulf, coast of India, Burma, Andaman Is.

dolichophallus: East Indies.

Remarks.—Re-examination of the specimen in the light of Tesch's work, which was inaccessible to me in 1926, shows that my indentification was erroneous. The present specimen (on which the above

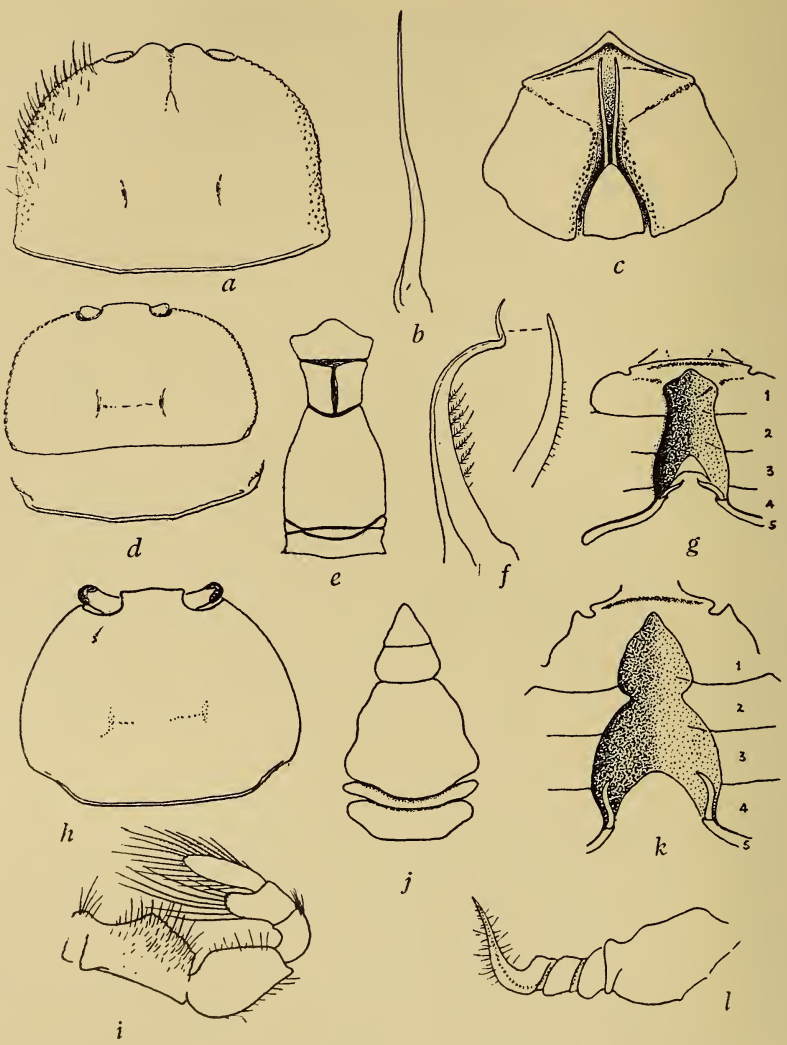


FIG. 56.—*Xenophthalmodes moebii* Richters. *a*, carapace. *b*, 1st pleopod ♂. *c*, sternite between chelipeds, with 7th abdominal segment and projecting apices of 1st pleopods, ♂ (owing to its convexity the 7th abdominal segment appears in the figure slightly shorter than it actually is).

Hexapus stebbingi Brnrd. *d*, carapace in dorsal view, with the true hind margin shown separately, because it is not seen in the dorsal view owing to the convexity of the carapace. *e*, abdomen ♂. *f*, 1st pleopod ♂, with apex further enlarged. *g*, sternum ♂, after removal of abdomen, showing external genital ducts.

Thaumastoplax spiralis n. sp. *h*, carapace. *i*, 3rd maxilliped. *j*, abdomen ♂. *k*, sternum ♂, after removal of abdomen, showing external genital ducts. *l*, 1st pleopod ♂.

description is solely based) agrees best with Alcock's description, though Alcock makes no mention of the elongate 1st pleopods. I consider it likely that the Delagoa Bay specimen is the same as Richters' and Alcock's material, but I am not yet absolutely convinced of its identity.

Gen. Hexapus de Haan

1910. Stebbing, *l. c.*, p. 315.

1910. Rathbun, K. Dansk. Vid. Selsk. Skr., 7 R., 5 Afd., no. 4, p. 348.

1918. Tesch, *l. c.*, p. 239.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, pp. 182–185.

Carapace much broader than long, convex longitudinally, regions not defined, front rather narrow, orbits small, antero-lateral margin convex, entire. Eye-stalks very short. Flagellum of ant. 2 not excluded from orbit. Palp of mxp. 3 rather long, 6th joint not expanded. Chelipeds robust and unequal in ♂, weaker and subequal in ♀. Legs strong, only 3 pairs. Abdomen with 5 segments in ♂, 3rd–5th being fused, 2nd shorter than 1st or 3rd, the 6th longitudinally divided by a suture; in both sexes basal segments not nearly covering whole width of sternum, fitting into a deep groove.

Hexapus stebbingi Brnrd.

Fig. 56, *d–g*.

1910. Stebbing, *l. c.*, p. 315, pl. 15 (Crust., pl. 41) (*sexpes*, non Fabr.).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 366.

Carapace setose laterally, smooth, with slightly depressed H-mark in middle, closely pitted, about 1½ times as broad as long, very convex longitudinally, front straight, twice as wide as one orbit, obscurely beaded, antero-lateral and lateral margin from orbit to postero-lateral angle (not actually confluent with postero-lateral margin) minutely but often obscurely beaded, postero-lateral margin on either side of the short hind margin straight. Cornea small. 7th joint of mxp. 3 almost as long as 5th and 6th together. Chelipeds furry, more robust in ♂ than ♀, left cheliped in ♂ larger than right, in ♀ subequal, hand of left chela in ♂ with an obscure ridge on middle of outer surface. Legs furry, dactyls slender, with very sharp ungues. Abdomen in ♂ lying in a very deep trench extending almost to buccal cavity, 5-segmented,

hour-glass shaped, 2nd segment shorter and narrower than 1st, 3rd–5th fused, 6th narrowest, longitudinally divided, 7th transversely pentagonal; 7-segmented in ♀, 3rd segment (or 3rd and 4th) widest, thence tapering evenly, 7th segment triangular. Pleopod 1 ♂ somewhat corkscrew-shaped, tapering to a fine acute apex; 2nd pleopod short, only entering base of groove on 1st. There is a short 5th sternite, at the inner end of which emerges the external continuation of the vas deferens (owing to defective preservation the internal connection with the testis could not be traced).

Length 10 mm., breadth 15 mm. Smallest ovig. ♀ 8 × 12 mm. As preserved, dirty white, cornea feebly pigmented.

Localities.—P.F. 7058 = St. Sebastian Bay, 34 fathoms (Stebbing); Agulhas Bank, from St. Sebastian Bay to Algoa Bay, 15–35 fathoms (S. Afr. Mus.).

Remarks.—The single ♀ specimen described and figured by Stebbing was acquired from the *Pieter Faure* collection by the late Dr. Peringuey, who at the time had not access to the *Pieter Faure* log-books, and thus could not inform Stebbing of the exact locality of no. P.F. 7058. The words used by Stebbing, however, led Tesch to interpret the record as meaning that there was some doubt as to the specimen having come from Cape waters. There is no doubt about the origin of the specimen, but it does not, in fact, seem to belong to de Haan's species *sexpes*.

Tesch has examined de Haan's original specimen of *H. sexpes* in the Leiden Museum, confirming the identity of the Siboga examples. He gives a figure of the ♂ abdomen showing the 1st and 2nd segments very short but equally wide, 6th segment undivided, 7th segment subtriangular and not wider than 6th; thus absolutely different from that of the present specimens. (See also Stephensen, *l. c.*, p. 183, fig. 53, B.) Tesch does not state the sex of de Haan's example, but expresses the opinion that Milne Edwards' and de Man's determinations are correct; he makes no reference to Fabricius beyond crediting the species to him.

Gen. Thaumastoplax Miers

1881. Miers, Ann. Mag. Nat. Hist. (5), viii, p. 261.
1909. Rathbun, Proc. Biol. Soc. Wash., xxii, p. 113.
1910. *Id.*, K. Dansk. Vid. Selsk. Skr., R. 7, Afd. 5, no. 4, p. 346.
1918. Tesch, *l. c.*, p. 238.

Similar to *Hexapus*, except palp of mxp. 3 rather long, 6th joint with inner distal corner expanded; 6th segment of abdomen ♂ without longitudinal suture.

In addition to Miers' original species from Goree Island, Senegambia, Miss Rathbun has described two Siamese species. The specimens described below do not appear to belong to any of these.

Thaumastoplax spiralis n. sp.

Fig. 56, *h–l*.

Carapace with very short pile, longer on lateral margins and pterygostomial region, smooth, closely and finely pitted when pile removed, the H-mark in middle very feebly indicated (visible only when pile removed), moderately convex; front straight, longer than (not quite 1½ times) one orbit, hind margin wide, costate. Eye-stalks stout, setose on hind (orbital) surface, cornea well developed. Chelipeds shortly furry, with some longer plumose setae on margins, right and left subequal in both sexes, or left slightly larger than right in ♂, stouter in ♂ than ♀, hand smooth, finger and thumb not gaping, cutting-edges feebly denticulate. Legs densely furry and with fringes of longer plumose setae, dactyls with very sharp ungues. Abdomen in ♂ lying in a deep trench, 5-segmented, triangular, with well-marked indent at junction of 6th segment with the fused 3rd–5th; in ♀ 7-segmented, 3rd and 4th segments widest. Pleopod 1 ♂ strongly calcified, stout basally, then twisted like a corkscrew, then curving outwards and ending in a fine acute apex. Pleopod 2 short. A short 5th sternite, with external continuation of vasa deferentia at inner ends (cf. *Hexapus*).

Length 5·5 mm., breadth 7 mm. As preserved, with faint reddish mottling, more or less ocellate, two red spots each surrounded by a pale ring in the position of the H-mark on carapace.

Localities.—Off St. Helena Bay, without precise locality or depth (S. Afr. Mus. ex s.s. *Pieter Faure* coll. 3 ♂♂, 1 non-ovigerous ♀); Saldanha Bay (University Cape Town, ♂♂, ♀♀).

Remarks.—The specific name is taken from the 1st pleopod. Dr. Gordon of the British Museum has kindly sent me sketches of the ♂ abdomen and 1st pleopod of Miers' type species *anomalipes*, and, as she remarks, there is no resemblance. The 1st pleopod of *anomalipes* is slender and only slightly sinuous, the abdomen is very much narrower (narrower even than that of *Hexapus stebbingi*), the 6th segment longer than wide.

Family CORYSTIDAE.

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, pp. 5, 103.

1910. Stebbing, *l. c.*, p. 311.

1930. Rathbun, Bull. U.S. Nat. Mus., no. 152, p. 10 (*Euryalidae*).

Carapace longitudinally oval, convex from side to side, regions not well defined; front bilobed or tridentate. Orbits more or less incomplete. First antennae small, folding longitudinally; 2nd antennae with the flagellum (when present) very long and hairy. No epistome. Mxp. 3 elongate, extending almost to the 1st antennae. Legs either all gressorial, or the last pair modified for swimming. Sternum and abdomen narrow, the latter with 5 segments in ♂, in both sexes the basal segments visible dorsally; in ♀ not covering the genital openings and not nearly covering the egg-mass. Genital openings in ♂ coxal.

Key to the South African Genera.

1. Anterior part of carapace dentate. Dactyls of legs dissimilar, 2nd, 3rd, and 5th lamellate . . . . *Nautilocorystes.*
2. Whole lateral margin of carapace dentate. Dactyls of legs similar, styliform . . . . . *Gomeza.*

Gen. Nautilocorystes M. Edw.

1910. Stebbing, *l. c.*, p. 311.

Carapace moderately convex, anterior half of the lateral margin dentate; front broad, bilobed; suborbital region produced forwards beyond level of apex of front and visible in dorsal view. Orbits directed forwards, eyes retractile. Ant. 2 with long hairy flagellum. Mxp. 3 with 4th joint longer than broad, but considerably shorter than 3rd joint; palp inserted on its oblique apex. Chelipeds slightly unequal, in ♂ not much larger than in ♀. Dactyls of 2nd and 3rd legs depressed (rather than compressed) and folding transversely under body, dactyl of 4th leg triquetral in section, dactyl of 5th leg compressed, ovate-lanceolate, inner margin convex. The fused 3rd–5th abdominal segments in ♂ not narrower than 2nd segment.

Remarks.—Burrowing in sand with only the tips of the antennal flagella projecting. The flagella form a tube conveying a current of water to the gill chamber; the outgoing current leaves the chamber beneath the branchiostegite; thus the normal course of the respiratory current in crabs is here reversed (see Garstang, 1896, J. Mar. Biol. Assoc. Plymouth, n.s., iv, p. 223).

Nautilocorystes ocellata (Gray)

Masked Crab.

Fig. 57, *a–c.*

1910. Stebbing, *l. c.*, p. 311 (*octodentatus*).
1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 264 (references).
Carapace with 4 spaced and sharp teeth on antero-lateral margin

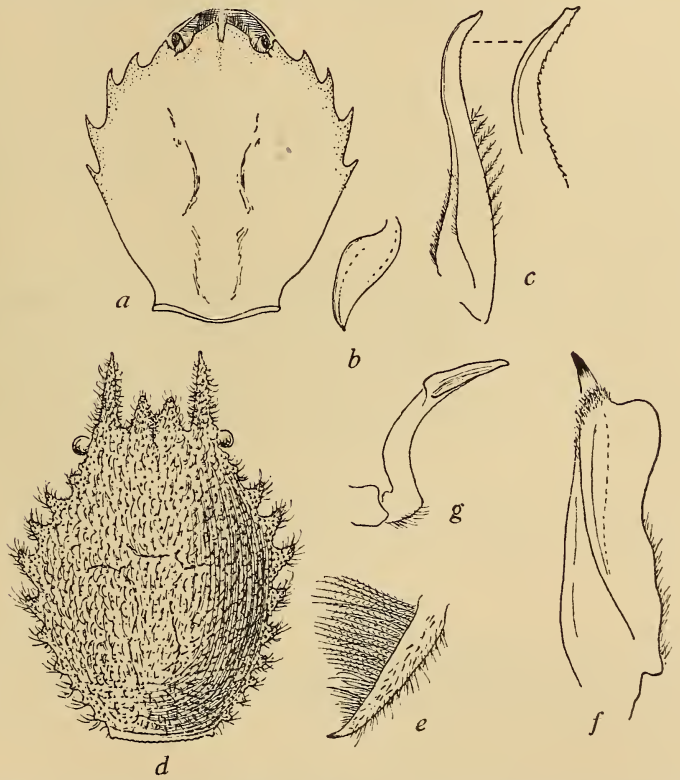


Fig. 57.—*Nautilocorystes ocellata* (Gray). *a*, carapace, suborbital processes showing in front. *b*, dactyl of right 5th leg. *c*, 1st pleopod ♂, with apex further enlarged.
Gomeza bicornis Gray. *d*, carapace. *e*, dactyl of right 5th leg. *f*, 1st pleopod ♂. *g*, 2nd pleopod ♂.

(5 if the blunter outer orbital angles are included), front broadly triangular, divided into 2 lobes by a median notch, surface closely pitted, pits replaced by granules on front, upper orbital margin, and antero-lateral margin. Flagella of ant. 2 longer than carapace in

young, but relatively shorter in adult. Chelipeds granulate, wrist with sharp spine on inner upper margin, hand with the upper outer and inner margins bluntly angular, the outer more distinct than the inner, finger with setose groove on upper surface, and another on upper outer surface. Dactyls of 2nd and 3rd legs narrow lanceolate, dactyl of 4th leg grooved on outer surface, dactyl of 5th leg ovate-lanceolate with convex inner and straight or slightly sinuous outer margin. Pleopod 1 ♂ moderately slender, curving outwards apically, outer distal margin and dorsal surface serrulate or scabrous; 2nd pleopod about half length of 1st.

Length up to ♂ 34, ♀ 28 mm., breadth ♂ 30, ♀ 24 mm. (incl. teeth). Sand-coloured, with thin reddish-brown lines forming ovals or circles.

Localities.—Simon's Bay, 12 fathoms (Stimpson); Cape St. Blaize and Saldanha Bay (Stebbing); Saldanha Bay, False Bay, Agulhas Bank, Knysna, Plettenberg Bay, to Algoa Bay, 10–45 fathoms (S. Afr. Mus.).

Remarks.—No definite record from Table Bay exists, although possibly the original specimens collected by Delalande were from here.

Stebbing (1900) remarks that the ♀ was then apparently unknown. In the South African Museum there are 3 ♀♀ (2 ovigerous). The chelipeds proportionately to the carapace are not much smaller than those of the ♂; the genital openings on the sternum between the 3rd legs are not covered by the abdomen (even in the non-ovigerous ♀), but only by the long shaggy hair on the apex of the abdomen.

The Indian species, *investigatoris* Alck. 1899, has a tridentate front and 2 spines on upper surface of hand of cheliped.

Gen. Gomeza Gray

1831. Gray, Zool. Miscell., p. 39.
1833. de Haan, Fauna Japon. Crust., pp. 4, 15 (*Oeidea*).
1886. Miers, Rep. H.M.S. *Challenger*, xvii, p. 211.
1930. Rathbun, *l. c.*, p. 10.
1935. Chopra, Rec. Ind. Mus., xxxvii, p. 500.

Carapace strongly convex, whole lateral margin dentate; front moderately broad, with triangular, apically truncate or notched, rostrum, flanked on either side by the supra-orbital spine, which is usually strong. Orbits directed laterally, eyes retractile. Antenna 2 with long hairy flagellum. Mxp. 3 with 4th joint about as broad as long. Chelipeds somewhat unequal. Dactyls of legs all alike, more or less styliform. Abdomen small, fused 3rd–5th abdominal segments in ♂ not narrower than 2nd segment.

Gomeza bicornis Gray

Fig. 57, *d–g*.

1831. Gray, *l. c.*, p. 39.

1835. de Haan, *l. c.*, p. 44, pl. 2, fig. 5 (*O. vigintispinosa*) (reference quoted from Miers, *l. c.*).

1886. Miers, *l. c.*, p. 212.

1906. Laurie, Herdman's Ceylon Pearl Fish. Rep., v, p. 421.

1927. Hale, S. Austral. Crust., pt. 1, p. 145, fig. 147.

1935. Chopra, *l. c.*, p. 505, footnote.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 366.

Regions of carapace very faintly indicated; no bosses or swellings on carapace; lateral margin with 9 teeth, rostrum dorsally grooved, deeply emarginate; supra-orbital tooth spiniform, extending beyond apex of rostrum; sub-orbital tooth extending to upper margin of orbit (on under side of supra-orbital tooth). Whole carapace, including lateral teeth and orbital spines, and pterygostomial region and sternum covered with rounded miliary granules, each one on the upper surface of carapace and on sternum bearing a seta or bristle. Chelipeds similarly granulate and setose; a strong spine or tooth on inner apex of wrist. Legs thickly setose; inner margin of 6th joint and proximal two-thirds of inner margin of dactyl of 5th leg with a fringe of long plumose setae.

Length (to median notch of rostrum) ♂ 22 mm., breadth (excl. lateral teeth) 16 mm. Hale: up to 35 mm. in length. Colour in life (see Hale) red, anteriorly brown, branchial regions yellow, antennae and chelipeds brown, legs yellow.

Locality.—Delagoa Bay (coll. van der Horst, 1939, 1 ♂, presumably washed up on beach, with soft parts decomposed).

Distribution.—East Indies, 10 fathoms (Miers), Japan, Ceylon, South Australia.

DROMIACEA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 477, 479.

1910. Stebbing, *l. c.*, p. 341 (*Brachyura Anomala*).

1913. Ihle, Siboga Exp. monogr., xxxix, *b*, pp. 1–96.

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 27.

Carapace subglobose, subquadrate, or pyriform; front narrow. Last pair, or last two pairs of legs more or less reduced in size and modified, dorsal in position. Buccal cavity squarish. Female genital openings

coxal. First abdominal appendages of ♀ present but reduced. Gills usually numerous.

Key to the Tribes, and South African Families.

I. Eyes and 1st antennae retractile into sockets (fig. 59, *g*, *h*). Sternum of ♀ traversed more or less completely by 2 obliquely longitudinal grooves	*DROMIIDEA.*
A. Last 2 pairs of legs reduced, subdorsal, usually prehensile. Epipods may be present on chelipeds but not on any of the legs. (5th legs sometimes as long as 3rd, but more slender) . . .	*Dromiidae.*
B. Only the last pair of legs reduced. Epipods on chelipeds and (usually) the following two pairs of legs	*Dynomenidae.*
II. Eyes and 1st antennae not retractile. Basal joint of eye-stalk visible, slender (fig. 65, *d*, *g*, *h*). Sternum of ♀ not traversed by any special grooves. . .	*THELXIOPEIDEA* (*HOMOLIDEA*)
A. Basal joint of eye-stalk about same length as terminal joint (fig. 65, *d*). Epipods on chelipeds and often also on following two pairs of legs. Gills 13–14 .	*Thelxiopeidae* (*Homolidae*).
B. Basal joint of eye-stalk much longer than terminal joint (fig. 65, *g*, *h*). No epipods on chelipeds or any of the legs. Gills 8	*Latreilliidae.*

Ihle unites the *Latreilliidae* with the *Homolidae*. Rathbun keeps them separate, and adopts the old name *Thelxiope* Raf. 1814 in place of *Homola* Leach 1815.

Family DROMIIDAE.

Sponge-crabs.

1910. Stebbing, *l. c.*, p. 342.
1913. Ihle, *l. c.*, pp. 4–96, pls. 1–4 (morphology, etc.).
1923. Rathbun, Biol. Res. "Endeavour," v, p. 144.
1924. Gurney, "Terra Nova" Rep., viii, pp. 188 *sqq.* (larval forms).
1937. Rathbun, *l. c.*, p. 30.

Carapace usually subglobular, but sometimes flat. Sternum of ♀ with 2 obliquely longitudinal grooves, of varying length. Last two pairs of legs reduced, subdorsal in position; 6th joint with a more or less stout spine opposing the (usually) short 7th joint (dactyl plus unguis) (fig. 58, *e*). Epipods may be present on the chelipeds, but not on any of the following legs. Vestiges of uropods usually present on sternal surface of 6th abdominal segment.

Remarks.—For the history of the inappropriate name *Dromia* (running crab) see Stebbing, 1893, Hist. Crust., p. 135.

Nearly all the representatives of this family conceal themselves by carrying about with them a piece of shell, sponge, or Ascidian, which is held in position on their backs by the last pair of legs, or sometimes the penultimate pair. To achieve this, not only has the position of the last two pairs of legs become dorsal or subdorsal, but there has also been a torsion of the dactyl on the last pair, so that instead of impinging against the lower end of the 6th joint it impinges more or less against the upper apex (*cf.* Ihle, *l. c.*, p. 18).

Certain species with large-sized eggs have an abbreviated larval development, *i.e.* the free-swimming stage is suppressed (see Hale, 1925, Proc. Linn. Soc. N.S.W., 50, p. 405). Growth-changes in the shape and armature of the carapace may also occur (Hale, *ibid.*).

The 1st pleopod ♂ does not offer such decisive specific characters as in some other groups of crabs.

For correct identification of a specimen it is usually necessary to denude the carapace, at least in part, of its furry covering.

Key to the South African Genera.

I. Carapace flat. 4th leg shorter than 3rd, ending in a large talon-like dactyl (fig. 58, *b*); 5th leg slender. Epipods on chelipeds. Sternal grooves in ♀ ending apart . *Conchoecetes.*

II. Carapace more or less globose. Dactyl of 4th leg not remarkably large or talon-like (fig. 59, *c*).

A. Epipods on chelipeds (fig. 58, *f*).

1. Legs not ridged or knobbed.

a. Sternal grooves ♀ ending apart . . *Dromia.*

b. Sternal grooves ♀ ending together . . *Dromidiopsis.*

2. Legs ridged or knobbed. Sternal grooves ♀ ending apart . . . . . *Petalomera.*

B. No epipods on chelipeds.

1. Legs smooth. Sternal grooves ♀ ending together.

a. Front deeply bifid (fig. 59, *f*, *g*) . . *Eudromidia.*

b. Front tridentate (S. Afr. species) (fig. 60, *a*).

i. 5th leg much longer than 4th . . *Pseudodromia.*

ii. 5th leg subequal to 4th.

α. Chelipeds alike in both sexes . *Dromidia.*

β. Chelipeds much larger in ♂ than in ♀ . . . . *Exodromidia.*

2. Legs ridged or knobbed.

a. Sternal grooves ♀ ending apart . . *Cryptodromia.*

b. Sternal grooves ♀ ending together.
i. Subbranchial region without a cavity . *Cryptodromiopsis.*
ii. Subbranchial region with a deep cavity causing a strong dorsal gibbosity of the branchial region (fig. 64) . . . . . *Speodromia.*

Gen. Conchoecetes Stimpson

1893. Henderson, Trans. Linn. Soc. Lond., v, p. 407.
1910. Stebbing, *l. c.*, p. 346.
1913. Ihle, *l. c.*, pp. 50, 87, 91.
1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 253.

Carapace depressed, subpentagonal, the grooves defining the regions well developed, but obscured under a covering of short close pile. Front tridentate, median tooth at a lower level than the others. Sternal grooves in ♀ ending apart, each on a conical tubercle between bases of 2nd legs (*i.e.* 1st walking legs). Fourth leg robust, dactyl large, curved, talon-like, closing against a blunt process of the 6th joint; 5th leg slender, dactyl small, no spine on either outer or inner apex of 6th joint. Epipods on chelipeds only.

Conchoecetes artificiosus (Fabr.)

Shell-carrying Crab .

Fig. 58, *a*, *b*.

1910. Stebbing, *l. c.*, p. 346.
1920. *Id.*, *l. c.*, p. 253.
1933. Chopra, Rec. Ind. Mus., xxxv, p. 28.

Antero-lateral and lateral margins of carapace more or less granulate, a short supra-orbital tooth, and 2 teeth on lateral margin, one behind cervical groove (fig. 58, *a*), one behind branchial groove; subhepatic region often granulate. Terminal abdominal segment ♂ triangular, but not ending in a sharp point. Hand of chelipeds with scattered granules, its outer surface with 2 blunt tubercles at base of finger-hinge; 2 tubercles on outer apex of wrist; chelipeds more massive in ♂ than in ♀. 2nd–4th legs more or less granulate, including coxal joints, a blunt tubercle on 5th joint; no spine on coxal joint of 2nd leg ♂. The long hairs on the outer surface of dactyl of 2nd leg form 3 divergent crests, with intervening bare strips, and those on 3rd leg form 2 divergent crests. Dactyl of 5th leg small, uncinate, without long setae. Eggs very small and numerous.

Length up to 27 mm. Smallest specimen examined 7 mm. Whitish, with drab-coloured pile, fringes on the dactyls of legs more or less reddish, tips of finger and thumb of chelipeds pinkish.

Localities.—Zululand coast, 26 fathoms (Stebbing); off Tugela River, 12–47 fathoms (S. Afr. Mus.).

Distribution.—Indian Seas to Hong-Kong, N. Australia, Japan.

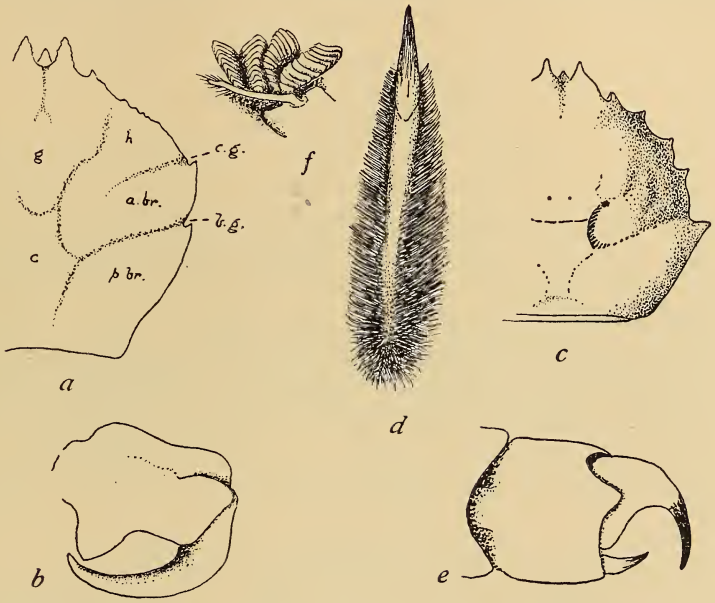


Fig. 58.—*Conchoecetes artificiosus* (Fabr.). *a*, carapace, denuded, showing regions: *a.br.*, *p.br.*, *c.*, *g.*, *h.*, anterior and posterior branchial, cardiac, gastric (mesogastric), and hepatic; and grooves: *b.g.*, *c.g.*, branchial and cervical. *b*, 6th and 7th (dactyl) joints of 4th leg (ventral surface).
Dromia dormia (Linn.). *c*, carapace, denuded. *d*, 7th joint (dactyl) of 3rd leg. *e*, 6th and 7th joints of 5th leg. *f*, base of right cheliped, with epipod, the two arthrobranchs cut off short.

Remarks.—This crab protects itself by holding one valve of a Lamellibranch mollusc over its back by means of the talon-like claws of the 4th legs.

Stebbing's record of a specimen from 460 fathoms off the Cape Point is certainly due to a misplaced label.

Gen. Dromia Fabr.

1910. Stebbing, *l. c.*, p. 342.
1913. Ihle, *l. c.*, pp. 21, 86, 89.
1937. Rathbun, *l. c.*, p. 30 (credited to Weber; unacceptable).

Carapace convex, slightly broader than long, regions more or less distinct; front tridentate, median tooth at a lower level. Sternal grooves ♀ ending apart on prominent tubercles between bases of 2nd legs. Legs not ridged or knobbed; 4th and 5th legs short, with a horny spine on inner apex of 6th joint opposing the dactyl, but none on outer apex. Epipods on chelipeds only.

Dromia dormia (Linn.)

Sleepy Sponge-crab.

Fig. 58, *c–e.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 812 (*rumphii*).

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., ii, p. 576, pl. 33, fig. 1, *a–d* (*rumphi*).

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 61.

1910. *Id.*, *l. c.*, p. 342 (part, not the False Bay specimen).

1923. Rathbun, Proc. Biol. Soc. Wash., xxxvi, p. 65 (*Dromidiopsis d.*).

1931. Shen, Hong-Kong Natur., ii, p. 96, figs. 3, 4, and pl. 4.

1942. Ward, Mauritius Inst. Bull., ii, p. 70 (*Dromidiopsis d.*).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 61, fig. 3 (plp. 1, 2 ♂).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 366.

[Not *D. dornica* (typ. err.) Balss, Schultze Reise, v, 1913, p. 109, = *Dromidia aegibotus*, p. 322.]

All parts except tips of fingers and thumbs and dactyls of legs covered with a rather harsh tomentum, with tufts of longer bristles scattered over the carapace. Antero-lateral margin of carapace with 3 pointed subequal teeth, lateral margin with one tooth immediately behind branchial groove; a very small supra-orbital denticle. Abdomen ♂ with median longitudinal ridge between shallow grooves; terminal segment about as broad as long. Chedipeds with 2 blunt tubercles on outer side of wrist. Dactyls of 2nd and 3rd legs bare above, the hairs forming a divergent crest on either side. Eggs very small and numerous.

Length up to 65 mm., breadth 70 mm. (Alcock: $5\frac{3}{4}$ in. in breadth). Brownish, tips of finger and thumb of chelipeds pink.

Localities.—Imhambane, P.E.A. (Hilgendorf); Durban (Stebbing, and S. Afr. Mus.); off Tugela River, 25 fathoms (S. Afr. Mus.); Delagoa Bay (coll. van der Horst).

Distribution.—Mauritius, east coast of Africa, Red Sea, Indian Seas to Japan.

Remarks.—Originally named "dormia" in allusion to its supposed soporific and narcotic properties (Stebbing, Hist. Crust., 1893, p. 135).

Under the name of this species Stebbing (1914, Trans. Roy. Soc. Edin., 50, p. 273) mentions some small specimens from Saldanha Bay ("Scotia" Exp.) whose systematic position he did not further elucidate. They are certainly not this species.

Gen. Dromidiopsis Borrad.

1900. Borradaile, Proc. Zool. Soc. Lond., p. 572.
1903. *Id.*, Ann. Mag. Nat. Hist. (7), xi, p. 298.
1903. *Id.*, F. Geogr. Mald. Laccad. Archip., ii, p. 576.
1913. Ihle, *l. c.*, pp. 25, 86, 90.

Carapace convex, usually longer than broad, regions very feebly defined; front tridentate. Sternal grooves ♀ ending together on a median tubercle between bases of chelipeds or 2nd legs. Legs not ridged or knobbed; 5th leg longer than 4th but usually shorter than 3rd, often with a spine on outer side of its 6th joint. Epipods on chelipeds only.

Dromidiopsis cornuta Brnrd.

Fig. 59, *a–d.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 367.

Covered with short close pile, the hairs rather thick and shaggy, especially on margins of carapace, chelipeds, and legs. Carapace as long as broad, pentagonal, regions obsolete, but branchial groove distinct, the lateral grooves of cardiac region reduced to elongate pits. Frontal teeth acute and divergent in ♀, spiniform and subparallel in ♂, the median tooth slightly shorter, deflexed, acute. A very blunt and feeble supra-orbital projection, an acute infra-orbital tooth, outer orbital angle distinct but not dentiform, antero-lateral angle rounded, lateral margins nearly straight, with a feeble indent at branchial groove; subhepatic region convex, without tubercles. Terminal abdominal segment ♂ ending in a sharp point. Cheliped with 2 tubercles on outer apex of wrist. Legs not knobbed; 4th leg with 6th joint subglobose, with spine on inner apex (one on outer apex doubtfully present); 5th leg shorter than 3rd, but longer than 4th, 6th joint with a spine on both inner and outer apex. Epipods on

cheliped only. Sternal grooves ♀ ending on a prominent knob on suture between sternites of chelipeds and 2nd legs. Eggs large, 1·5 mm. in diam., about 20 in number.

Length ♂ 9·5, ♀ 7 mm., breadth ♂ 8·5, ♀ 7 mm.

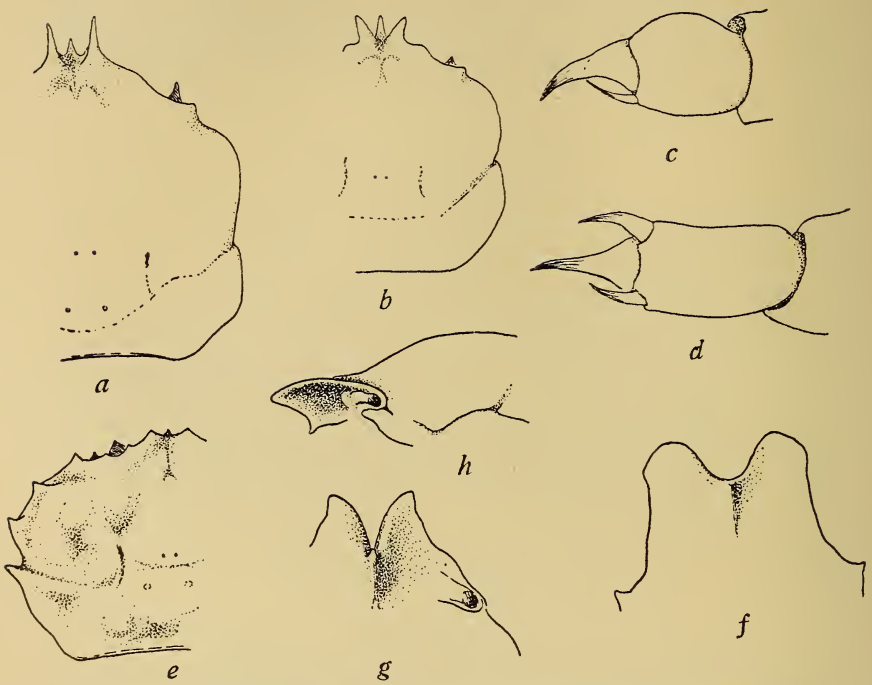


Fig. 59.—*Dromidiopsis cornuta* Brnrd. *a*, *b*, carapace, ♂ and ♀ respectively, denuded. *c*, inner view of 6th and 7th joints of 4th leg. *d*, outer view of 6th joint of 5th leg with dactyl (7th joint) foreshortened.
Petalomera wilsoni (F. & G.). *e*, carapace, denuded.
Eudromidia frontalis (Hend.). *f*, ventral view of frontal lobes (after Henderson).
Eudromidia hendersoni (Stebb.). *g*, ventral view of frontal lobes. *h*, lateral view of anterior part of carapace.

Localities.—False Bay, 23 fathoms (♀), and off Cape St. Blaize, 39 fathoms (♂) (S. Afr. Mus.).

Gen. Petalomera Stimpson

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 226.
1903. Borradaile, Ann. Mag. Nat. Hist. (7), xi, p. 300.
1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 179.
1913. Ihle, *l. c.*, pp. 48, 87, 91.

1923. Rathbun, Biol. Res. "Endeavour," v, p. 153.

1927. Hale, S. Austral. Crust., pt. 1, p. 111.

Carapace convex, regions clearly or indistinctly defined; front tridentate, upper lobes rather large. Sternal grooves ♀ ending apart behind bases of chelipeds; 4th joint of chelipeds and 2nd and 3rd legs, or chelipeds and 2nd legs only, more or less dilated and ridged (petaloid). Legs with or without knobs; 4th and 5th legs subequal, or 5th distinctly the longer. Epipods on chelipeds only.

Petalomera wilsoni (F. & G.)

Fig. 59, *e*.

1902. Fulton and Grant, Proc. Roy. Soc. Vict., xv, p. 61, pl. 9 (*Cryptodromia w.*).

1923. Rathbun, *l. c.*, p. 154, pl. 42, fig. 1.

1927. Hale, *l. c.*, p. 113, fig. 111 (after Rathbun).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 368.

Covered with very soft and dense, spongy pile, which on the carapace accentuates instead of obliterating the underlying regions. Frontal lobes very shortly pointed, median rostral point acute. A supra- and an infra-orbital tooth; outer orbital angle with short fissure but not toothed. Antero-lateral margin with 4 short sharp teeth, including the one behind branchial groove, the foremost one at a lower level than the others; all the teeth blunter in juv. No buccal tubercle; 2 supra-sutural tubercles, the one immediately below the infra-orbital tooth inconspicuous and smaller than the other more ventral one. Sternal grooves ♀ ending apart on small knobs on sternal suture between 2nd and 3rd legs. Terminal abdominal segment ♂ broader than long, triangular, apically blunt. Chelipeds more massive in ♂ than in ♀, with 2 prominent knobs on wrist. 2nd and 3rd legs each with a knob on outer apex of 5th and 6th joints; 5th leg distinctly more slender than 4th, in both a spine on apex of 6th joint opposing the dactyl. No spine on coxal joint of 2nd leg ♂. Epipod on cheliped only.

Length up to ♂ 42, ♀ 28 mm., breadth ♂ 60, ♀ 37 mm.

Localities.—Algoa Bay to Natal (off Umhlangakulu River), 30–85 fathoms (S. Afr. Mus.).

Distribution.—Southern Australia.

Remarks.—Comparison of an Australian ♀ specimen, kindly forwarded by Mr. M. Ward, shows no character on which to separate the South African specimens, except that in the latter the outer orbital angle

can scarcely be called prominent; the smaller of the 2 subhepatic (supra-sutural) tubercles is very inconspicuous, in fact practically obsolete; but, on the other hand, the supra-orbital margin is perhaps a little more prominent in the Australian specimen.

The spongy, almost gelatinous, appearance of the pile, when the animal is in liquid or semi-dry, is like the representations given by Fulton and Grant, and Rathbun.

So far as material has been available for verification, this crab and *Conchoecetes artificiosus* and *Dromia dormia* are the only South African Sponge-crabs in which the terminal abdominal segment ♂ is apically rounded or triangularly pointed, instead of ending in a prominent *spiniform* point.

Gen. Eudromidia Brnrd.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 13 (*Eudromia*, preocc. Geoffroy, 1832, Aves).

1910. Stebbing, *l. c.*, p. 346 (*Eudromia*).

1920. *Id.*, Ann. S. Afr. Mus., xvii, p. 253 (not the species thereunder described) (*Eudromia*).

1921. *Id.*, *ibid.*, xviii, p. 462 (*Eudromia*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 368.

Carapace convex, longer than broad, regions not, or scarcely, defined; front prominently bilobed, with a small median rostral point at a much lower level. Sternal grooves ♀ ending together on a median tubercle between bases of 2nd legs. Legs not knobbed or ridged; 4th and 5th legs unusually small; a spine on inner apex of 6th joint (opposing the dactyl) in 4th leg, but none on outer apex; spines on 6th joint of 5th leg ?. No epipods on chelipeds or legs. Peduncle of antenna 1 large.

Remarks.—An endemic genus with two species, both of which appear to be rare. It must be admitted that the difference between the frontal margin in this genus and that in other genera is one of degree only.

Key to the Species.

1. Indent between frontal lobes wide and shallow, U-shaped. Lateral margin of carapace toothed . . . . . *frontalis.*
2. Indent between frontal lobes narrow and deep, V-shaped. Lateral margin entire, except for notch at branchial groove . . . . . *hendersoni.*

Eudromidia frontalis (Hend.)

Fig. 59, *f*.

1910. Stebbing, *l. c.*, p. 346 (*Eudromia f.*).

Covered with short thick pile. Frontal lobes up-turned and separated by a wide and shallow indent. Lateral margin of carapace with a "prominent blunt spine," behind which one or two smaller processes, and a prominent tooth behind branchial groove. Terminal abdominal segment ♂ ending in a sharp point. Each abdominal segment ♀ (except 1st) with a median elevation, on each side of which a small projection on the anterior margin overlapping the preceding segment.

Length (♀) 15 mm., breadth 11·7 mm., cheliped 20 mm. (Henderson).

Locality.—Agulhas Bank, 150 fathoms (Henderson).

Remarks.—Known only from the one ♂ and one ♀ collected by H.M.S. *Challenger*.

Eudromidia hendersoni (Stebb.)

Fig. 59, *g*, *h*.

1921. Stebbing, *l. c.*, p. 462, pl. 19 (Crust., pl. 114) (*Eudromia h.*).

Covered with short thick pile. Frontal lobes horizontal, separated by a deep and narrow V-shaped indent. Lateral margin entire except for a shallow indent at the branchial groove. Abdominal segments 2–6 in ♀, each with 2 low median tubercles, one near the anterior, one near the posterior margin; no projections overlapping the preceding segments.

Length (to tips of frontal lobes) 13 mm., breadth 12 mm., cheliped *ca.* 15 mm.

Locality.—False Bay, 19 fathoms (Stebbing).

Remarks.—Stebbing did not clean the pile off the frontal lobes, and consequently his figure is far from accurate. Also his figure of the 5th leg shows no spine on inner apex of 6th joint opposing the dactyl; both 5th legs are missing from the now dismembered type specimen, but such a spine was presumably present, as it is present on the 4th leg. Both pairs of antennae are missing.

Known only from the single ♀ specimen collected by the s.s. *Pieter Faure*.

Gen. Pseudodromia Stimpson

1893. Henderson, Trans. Linn. Soc. Lond., v, p. 406.

1910. Stebbing, *l. c.*, p. 345.

Carapace very convex, longer than broad, regions not defined, only the branchial groove and the longitudinal grooves bordering the cardiac region moderately distinct, the latter ending in front in pits. Front forming either a tridentate rostrum with the median point at a lower level, or a single conical rostral point. An incision between the ventral margin of the rostral point and the median crest of the epistome. Sternal grooves ♀ ending together on a median tubercle between bases of 2nd legs. Legs not knobbed or ridged; 4th shorter than 3rd, 5th longer than 2nd. No epipods on chelipeds or legs.

Remarks.—The genus comprises two South African species, and one from Ceylon and Obock; both are easily distinguished from other Sponge-crabs by the unusual length of the 5th leg.

Key to the Species.

1. Front tridentate.
   a. Frontal teeth subparallel, concealing the median tooth . *latens.*
   b. Frontal teeth divergent, median tooth visible from above . . . . . *rotunda.*
2. Front forming a conical entire rostral process . . . [*integrifrons*].

Pseudodromia latens Stimpson

Fig. 60, *e*, *f*.

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, pp. 226, 240.

1900. Stebbing, Mar. Invest. S. Afr., i, p. 24.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 178, pl. 21, fig. 3.

1910. Stebbing, *l. c.*, p. 345 (part: nos. 15 and 16).

? 1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 273.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 368.

Covered with short close, yellowish or brownish pile, longer towards edges of carapace and on chelipeds and legs. Carapace convex, regions indistinct, hollowed laterally in front of branchial groove for reception of the "knee-joint" (junction of 4th and 5th joints) of 5th leg. Front tridentate, the 2 upper teeth subparallel and close together, concealing in dorsal view the much smaller lower median tooth. A very blunt supra-orbital projection, and a blunt infra-orbital tooth. Antero-lateral and lateral margin evenly convex, indented at the branchial groove, but without a tooth behind this indent. Terminal abdominal segment ♂ ending in a sharp point. No spine on coxal joint of 2nd leg ♂. Sixth joint of 4th leg without apical spines (some-

times a minute one amongst the fur on outer apex); in 5th leg a small spine on both inner and outer apex. In ♀ outer rami of 2nd–5th pleopods enlarged and closing round the eggs laterally. Eggs large, 2 mm. in diam., not numerous.

Length up to ♂ 29, ♀ 36 mm., breadth ♂ 22·5, ♀ 32 mm. Crimson or rose-red, carapace and abdomen more or less mottled or speckled,

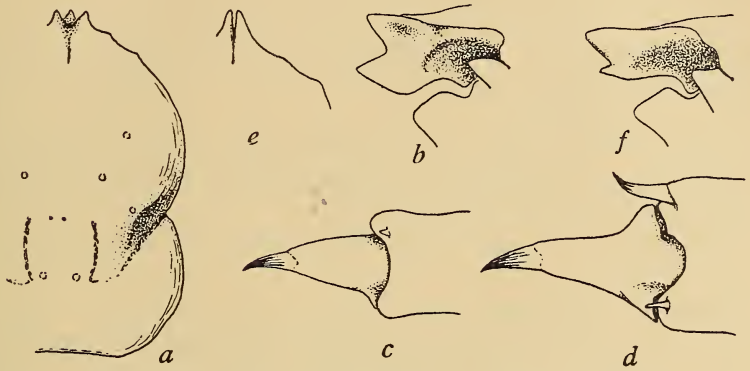


Fig. 60.—*Pseudodromia rotunda* (McLeay). *a*, carapace, denuded. *b*, lateral view of frontal lobe and rostral tooth. *c*, apex of 6th joint with dactyl of 4th leg. *d*, the same of 5th leg (in both the dactyl is shown foreshortened; setae omitted).
Pseudodromia latens Stimpson. *e*, dorsal view of frontal lobes. *f*, lateral view of frontal lobe and rostral tooth.

6–8 small circular areas, which are bare of pile, deeper in colour, as are likewise the lateral cardiac grooves, legs rose-red, eye-stalks crimson, cornea maroon.

Localities.—Simon's Bay, 12 fathoms (Stimpson); False Bay, 10–30 fathoms (Stebbing); Saldanha Bay, Table Bay, west coast of Cape Peninsula, False Bay to East London, 0–55 fathoms (S. Afr. Mus.).

Remarks.—See under *rotunda*.

Pseudodromia rotunda (McLeay)

Fig. 60, *a–d*.

1838. McLeay, Annulosa S. Afr., p. 71 (*Dromia r.*).

1849. *Id.*, in Smith, Illustr. Zool. S. Afr. Invert., p. 71 (*Dromia r.*).

? 1884. Miers, Crust. H.M.S. *Alert*, pp. 552, 553.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 16, pl. 1, fig. 8, (*latens*, non Stimpson).

? 1894. Ortmann, Semon's Austral. Reise, v, p. 35 (*latens*).

1904. Doflein, D. Tiefsee Exp., vi, p. 12, pl. 8, figs. 1–6 (*latens*, non Stimpson).

1910. Stebbing, *l. c.*, p. 343 (*Dromidia* ? *r.*).

1910. *Id.*, *ibid.*, p. 345 (*latens*, part: no. 29).

? 1913. Balss, Schultze Reise, v, p. 109 (*latens*).

? 1923. Odhner, Medd. Göteb. Mus., xxxi, p. 26 (*latens*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 369.

Resembles *latens* in all respects except the front, in which the 2 upper teeth are a little distance apart and slightly divergent, allowing the equally large lower median tooth to be seen in dorsal view. Size and colour as in *latens*.

Localities.—Simon's Bay, 10–12 fathoms (Henderson); False Bay (Stebbing); St. Francis Bay, 100 metres (Doflein); False Bay to East London, 8–35 fathoms (S. Afr. Mus.).

Distribution.—? Amirante Is. (Miers). Off Dar-es-Salaam, 400 metres (Doflein).

Remarks.—As McLeay's brief description fitted Stimpson's species so well, and as this is the most abundant Sponge-crab in False Bay, where it is often washed up on the beach, and therefore most likely to be obtained by collectors like Sir Andrew Smith and Verreaux (see McLeay, *l. c.*, p. 1), I had already come to the conclusion that Stimpson's and McLeay's species were identical. Then in 1937 Mr. Ward informed me that McLeay's type was in the Australian Museum, and sent me a photograph of it. In this photograph the 2 dorsal frontal teeth are separate and the lower median tooth is visible. Henderson's and Doflein's figures agree in this respect, but Stimpson's does not. The whole series in the South African Museum was then examined, and it was found that this difference in the frontal lobes was the only difference, and that it was not a sexual difference. Although there were slight variations in both forms, there was never any doubt as to whether a specimen was *latens* or *rotunda*.* Two distinct species may therefore be accepted.

The geographical distribution of both in South African waters is the same, except that in the South African Museum there are no specimens of *rotunda* from Table Bay or the west coast of South Africa.

The record of Miers, and that of Doflein (off Dar-es-Salaam), are rather surprising, and the specimens should be re-examined; Miers said he was not certain of his identification. The s.s. *Pieter Faure*

* There is one specimen (S. Afr. Mus., No. A808) in which all three frontal lobes are fused into a broadly triangular rostral process, slightly concave dorsally; somewhat similar to that of *integrifrons* Hend. 1893, but not so acutely prominent.

obtained no specimens of either species off the Natal coast, the most north-easterly locality being East London.

In the above references, queries are put against those which merely record localities under the name "*latens*" without giving a figure; they may refer either to *rotunda* or to *latens*. Kossmann (1880, p. 67) regarded *rotunda* as synonymous with *unidentata* (*v. infra*, p. 323), but that opinion is now clearly untenable. McLeay's name refers not so much to the circular profile of the carapace as to its globosity.

Both species cover themselves with the compound Ascidians *Gynandrocarpa placenta* (incl. *G. domuncula*: see Michaelsen, 1934, Trans. Roy. Soc. S. Afr., xxii, p. 132) and *Distaplia skoogi*. The Ascidian is usually more or less globular in shape, and the opening triangular; the apex of the triangular opening dorsal, over the rostrum of the crab. The long 5th legs of the crab are hooked into the Ascidian just inside the sloping sides of the opening.

Gen. Dromidia Stimpson

1910. Stebbing, *l. c.*, p. 342.
1913. Ihle, *l. c.*, pp. 31, 86, 90.
1923. Rathbun, *l. c.*, p. 147.
1937. *Id.*, *l. c.*, p. 32.

Carapace convex, as long as broad, or broader than long, regions more or less distinct. Front tridentate, median tooth at lower level. Sternal grooves ♀ ending together, usually between the chelipeds. Legs not knobbed or ridged; 4th and 5th legs subequal, 6th joint with spine on inner apex opposing dactyl, and sometimes also one on outer apex. No epipods on chelipeds or legs.

Key to the South African Species.

1. Antero-lateral margin (between outer orbital angle and branchial groove) with 1 sharp tooth. Covered with dense soft and shaggy hair . . . . . *hirsutissima.*
2. Antero-lateral margin with 2 sharp teeth. Sparsely covered with longer and shorter spiniform bristles . . . *dissothrix.*
3. Antero-lateral margin with 3 sharp teeth. Densely covered with short stiff bristles . . . . . *aegibotus.*
4. Antero-lateral margin without teeth. Covered with short close pile. End of 5th leg conspicuously 3-spinate . *unidentata.*

Dromidia hirsutissima (Lam.)

Shaggy Sponge-crab.

Fig. 61, *a–c.*

? 1793. Fabricius, Entom. Syst., ii, p. 456 (*aegagropila*).

1818. Lamarck, Hist. Nat. Anim. sans Vert., v, p. 264 (*Dromia h.*).

1838. McLeay, Annulosa S. Afr., p. 71 (*hirtissima*: typ. err.).

1910. Stebbing, *l. c.*, p. 342.

Covered with short stiff pile, and long dense fibrous and shaggy brown or yellow hairs. Carapace broader than long, convex with low gibbosities, the most conspicuous being one on inner anterior portion of branchial region, and separated by a rather well-marked groove from cardiac region. Front declivous, the 3 teeth subequal, acute. A sharp supra-orbital tooth, and a sharp infra-orbital tooth, outer orbital angle acutely toothed; 2 buccal teeth, the hinder one blunt; supra-sutural gibbosity distinct, but subhepatic region smooth and concave. Antero-lateral margin with one sharp tooth; a blunt prominence (scarcely a tooth) immediately behind cervical groove and a blunt tooth behind branchial groove. Terminal abdominal segment ♂ triangular, broader than long, ending in a sharp point. Sternal grooves ♀ ending together on a slight prominence between bases of chelipeds. Fifth leg subequal in length to, but more slender than 4th; in 5th leg a horny spine on inner apex of 6th joint opposing dactyl, and also one on outer apex; only the inner spine on 4th leg. A sharp backwardly directed spine on coxal joint of 2nd leg ♂. No epipods on chelipeds or legs. Eggs numerous, 1·5–2 mm. in diam.

Length up to 37 mm., breadth 45 mm. In juveniles (14 mm.) the length and breadth are equal. Maroon or brick-red, with yellowish fur.

Localities.—Lambert's Bay, Saldanha Bay, Table Bay, west coast of Cape Peninsula, Simonstown (S. Afr. Mus.).

Remarks.—There are two old dried specimens in the South African Museum, the larger measuring 42 × 53 mm., alleged to be from a collection made at Mauritius by Monsieur Robillard; as this species has not been found on any part of the South African coast east of False Bay, the source of these specimens must be regarded as doubtful.

The Shaggy Sponge-crab appears to be fairly common in Table Bay. One of the Saldanha Bay specimens is holding a compound Ascidian over its back.

Specimens sent to the British Museum were stated by Dr. Gordon

to agree with specimens there labelled *hirsutissima*. If it could be proved that this was Fabricius' species, his name (*aegagropila* = wild-goat pile) would be most appropriate.

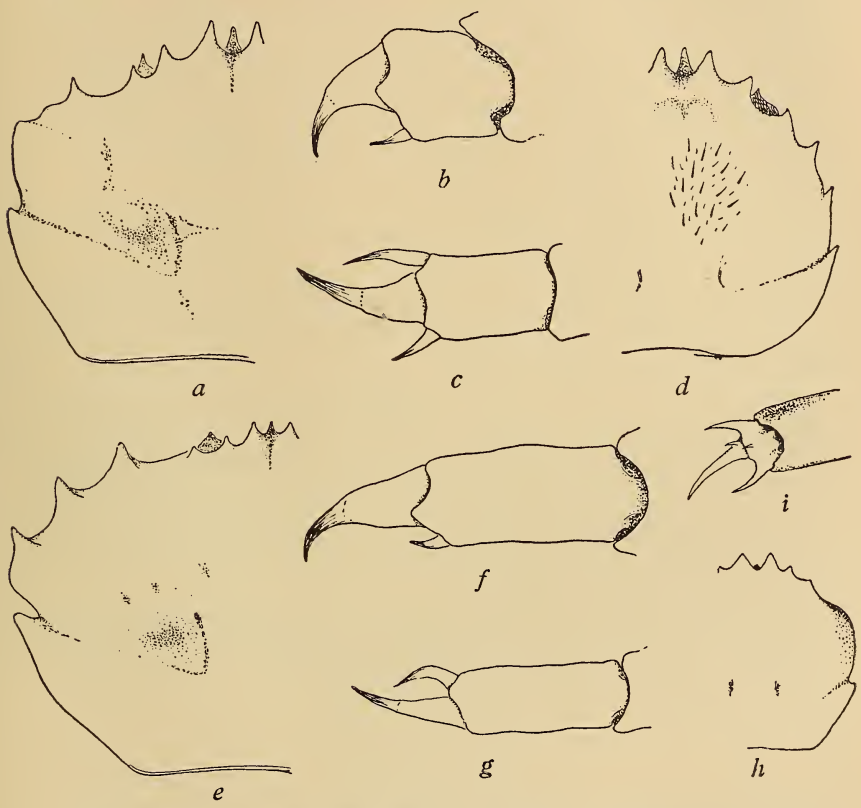


Fig. 61.—*Dromidia hirsutissima* (Lam.). *a*, carapace, denuded. *b*, *c*, 6th joint and dactyl of 4th and 5th legs respectively.
Dromidia dissothrix Brnrd. *d*, carapace, partly denuded.
Dromidia aegibotus Brnrd. *e*, carapace, denuded. *f*, *g*, 6th joint and dactyl of 4th and 5th legs respectively.
Dromidia unidentata (Rüpp.). *h*, carapace, denuded. *i*, apex of 6th joint and dactyl of 5th leg.

Dromidia dissothrix Brnrd.

Fig. 61, *d*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 367.

Sparsely covered with longer and shorter spiniform bristles and setae. Carapace as broad as long, subcircular, convex, regions obsolete, even the branchial and lateral cardiac grooves very feebly

indicated. Frontal teeth triangular, acute, subequal. A prominent sharp supra-orbital tooth, outer orbital angle dentiform; an acute infra-orbital tooth. Antero-lateral margin with 2 sharp teeth, and a smaller one behind branchial groove. Subhepatic region convex, without tubercles. Sternal grooves ♀ ending on a median tubercle between bases of chelipeds. Two sharp tubercles on wrist of chelipeds. Legs not knobbed. Fifth leg slightly longer than 4th; 6th joint in both legs with spine on inner apex opposing the dactyl, in 5th leg a spine also on outer apex. No epipods on chelipeds or legs.

Length and breadth 9 mm.

Locality.—Off Hoets [*sic*] Bay, 24/xii/97, 1 non-ovig. ♀ (S. Afr. Mus., ex coll. s.s. *Pieter Faure*).

Remarks.—The locality appears to be Hout Bay, west coast of Cape Peninsula, because on the date given the *Pieter Faure* was not near Hoetjes Bay inside Saldanha Bay.

The specimen is sexually mature, and for this reason can scarcely be a not fully-grown example of either *hirsutissima* or *aegibotus*. The 6th joints of 4th and 5th legs are like those of *hirsutissima*, but I have seen young examples of the latter which present all the characters of the adult except that the breadth does not exceed the length. Moreover, the sparse covering is different from that of any other South African Dromiid.

The outline of carapace is similar to that of *Cryptodromia coronata* Stimpson (see de Man, Arch. Naturg., liii, p. 398, pl. 18, fig. 2, ♂), but this, being a *Cryptodromia*, has knobbed legs.

Dromidia aegibotus Brnrd.

Scrubbing-brush Crab.

Fig. 61, *e–g*.

1910. Stebbing, *l. c.*, p. 342 (*dormia*, non Linn., part: the False Bay specimen).

? 1913. Balss, Schultze Reise, v, p. 109 (*Dromia dornica* (typ. err.), non *dormia* Linn.).

? 1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 273 (small unidentified specimens from Saldanha Bay).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 366.

Covered with short stiff bristles, like a scrubbing-brush or curry-comb. Carapace broader than long, convex with low gibbosities, the most conspicuous being one on inner anterior portion of branchia

region and separated by a rather well-marked groove from the cardiac region. Front declivous, the 3 teeth subequal and acute. A sharp supra-orbital tooth, a sharp infra-orbital tooth, outer orbital angle blunt, with a very short fissure below it. Two blunt buccal teeth, subhepatic region convex, supra-sutural gibbosity obscure. Antero-lateral margin with 3 sharp teeth, and a prominent tooth behind branchial groove. Terminal abdominal segment ♂ triangular, broader than long, ending in a sharp point. Sternal grooves ♀ ending together on a slight prominence between bases of chelipeds. Fifth leg distinctly shorter and more slender than 4th; in both a horny spine on inner apex of 6th joint opposing the dactyl; that on 4th leg being small in comparison with the dactyl. A sharp backwardly directed spine on coxal joint of 2nd leg ♂. No epipods on chelipeds or legs. Eggs large, 1·5–2 mm. in diam., not very numerous.

Length up to ♂ 70, ♀ 55 mm., breadth ♂ 95, ♀ 70 mm. Reddish, the bristles brownish or yellowish.

Localities.—False Bay (Stebbing, Balss); ? Saldanha Bay (Stebbing); Table Bay, off Cape Point, False Bay, Algoa Bay, 17–32 fathoms (S. Afr. Mus.).

Remarks.—The Buffels Bay (False Bay) specimen sent to Stebbing (no. 39) was a ♂; Stebbing was therefore unaware that in the ♀ the sternal grooves converge to a median tubercle. The specimen, however, is quite unlike *Dromia dormia*, but bears Stebbing's autograph label. Whether Balss also fell into the same error is impossible to say, without re-examination of his material. It seems unlikely that the true *D. dormia* should be found as far west as False Bay; if it were, surely the s.s. *Pieter Faure* would have secured at least one specimen.

In contradistinction to the Shaggy Sponge-crab, the bristly covering of the Scrubbing-brush crab has the appearance of close-cropped turf (ἀιγιβοτος).

There is a general resemblance to *D. erythropus* (see Rathbun, 1937, *l. c.*, p. 31, pl. 6.)

Dromidia unidentata (Rüppell)

Fig. 61, *h*, *i*.

1830. Rüppell, Beschreib. 24 Krabben, p. 16, pl. 4, fig. 2, pl. 6, fig. 9.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 813.

1888. de Man, J. Linn. Soc. Lond., xxii, p. 207, pl. 14, figs. 4, 5.

1894. Ortmann, Semon's Austral. Reise, v. p. 34.

1901. Alcock, Cat. Decap. Crust. Ind., i, p. 47, pl. 2, fig. 6.

1905. Nobili, Boll. Mus. Zool. Univ. Torino, xx, no. 506, p. 4.

1913. Ihle, *l. c.*, p. 31.

1915. Laurie, J. Linn. Soc. Lond., xxxi, p. 426.

Covered with short close pile. Carapace convex, regions not defined, but lateral grooves of cardiac region usually distinct. Frontal lobes triangular, rostral tooth inconspicuous. A supra-orbital tooth; outer orbital angle prominent, but scarcely dentiform, behind it the antero-lateral margin runs in a sigmoid curve without teeth. A blunt tooth behind branchial groove. Sternal grooves ♀ ending together between bases of 2nd legs. Sixth joint of 4th and 5th legs with a strong spine on both inner and outer apices, these two legs, especially the 5th, thus appear to end in 3 claw-like spines, the middle one being the dactyl (fig. 61, *i*).

Length and breadth ♀ 30 mm. Whitish, with dark brown or blackish pile.

Localities.—Mozambique (Bianconi); Delagoa Bay (coll. van der Horst).

Distribution.—East coast of Africa, Red Sea, Indian Seas and East Indies.

Remarks.—The Delagoa Bay specimen collected by Dr. C. J. van der Horst was concealed under a colony of the Actinian *Palythoa nelliae.*

Dromidia sp.

There is one ♂ specimen (S. Afr. Mus., No. A8301, 32° 45′ S., 28° 26′ E., 36 fathoms), 6 mm. in length and breadth, which can scarcely be separated from *Dromidiopsis cornuta*, except that the frontal teeth are short and triangular, the rostral tooth is inconspicuous, the infra-orbital tooth is obsolete, and there is no trace of any epipods.

Gen. Exodromidia Stebb.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 64.

1910. *Id.*, *l. c.*, p. 344.

Like *Dromidia*, but chelipeds much larger in ♂ than in ♀.

Remarks.—The reasons for instituting this genus do not seem very strong; but if *spinosa* is to be separated from *Dromidia* on account of the marked sexual dimorphism in the chelipeds, clearly *bicornis* should be included with it. Both species are endemic in South Africa.

Key to the Species.

1. Frontal lobes broadly triangular. Coxal joint of 2nd leg ♂ without a spine . . . . . *spinosa.*
2. Frontal lobes slender, spiniform. Coxal joint of 2nd leg ♂ with backwardly directed spine . . . . . *bicornis.*

Exodromidia spinosa (Studer)

Fig. 62, *a*, *b*.

1905. Stebbing, *l. c.*, p. 65, pl. 18.
1910. *Id.*, *l. c.*, p. 344.

Covered with short fine pile intermixed with solitary short hairs. Carapace about as broad as long, with 2 transverse series each of 3 conical tubercles, in front of and behind the more or less transversely conical tubercle in middle of gastric region; a transverse ridge on anterior border of intestinal region. Frontal lobes large, triangular, the lower median rostral tooth small and conical. An infra-orbital tooth, and outer orbital angle dentiform (when seen in dorsal view). Lateral margin with 3 teeth, the 3rd behind the branchial groove; often some small denticles behind the 3rd tooth. Terminal abdominal segment ♂ triangular, broader than long, ending in a sharp point. Sternal grooves ♀ ending together on a tubercle between bases of 2nd legs. Third joint of peduncle of ant. 2 with a blunt projection on outer apex. Chelipeds ♂ (when fully developed) more than twice as long as carapace, in ♀ very little longer than carapace. Fourth and 5th legs subequal, short, 6th joint in both with a horny spine on inner apex opposing dactyl, but none on outer apex. No spine on coxal joint of 2nd leg ♂. No epipods on chelipeds or legs. Eggs large, *ca.* 1·5 mm. in diam., not numerous.

Length up to ♂ 34, ♀ 22 mm., cheliped ♂ 95, ♀ 31 mm. Mottled with brick-red or orange on a cream ground-colour, legs banded or mottled with reddish, tubercles on carapace and chelipeds white (K. H. B.).

Localities.—South of the Cape, 117 fathoms (Studer); Table Bay, 178 metres, and St. Francis Bay (Doflein); off Cape Point, 91 fathoms (Stebbing); west coast from off Saldanha Bay to south of Cape Point, 80–195 fathoms (S. Afr. Mus.); False Bay and off Cape Hangklip (S. Afr. Mus.).

Remarks.—Juveniles of less than about 10 mm. in length are feebly

sculptured on the carapace, though the grooves bounding the cardiac region are usually distinct.

This Sponge-crab does not apparently cover itself with sponges or Ascidians. Most of the specimens are much obscured by fine greenish

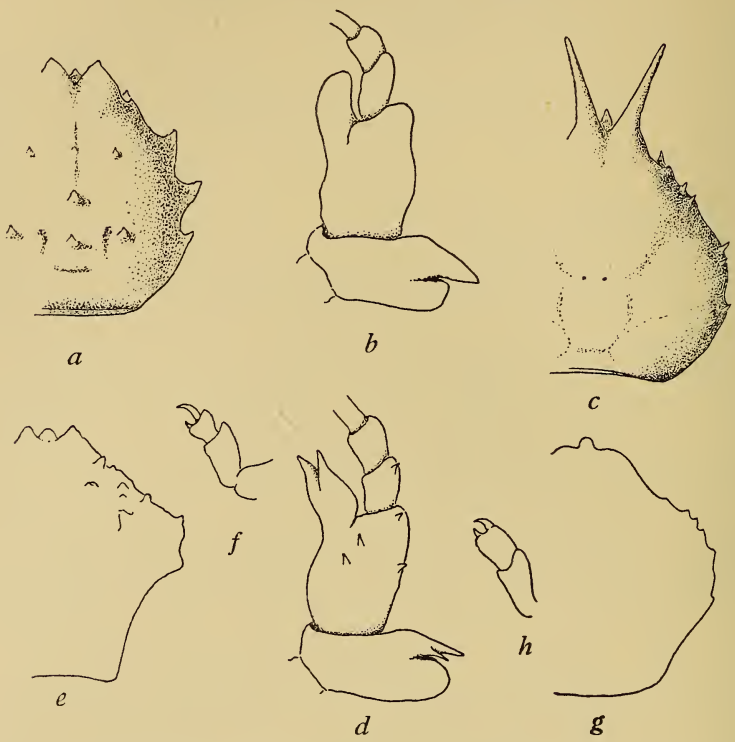


Fig. 62.—*Exodromidia spinosa* (Studer). *a*, carapace, denuded. *b*, ventral view of right peduncle of antenna 2.
Exodromidia bicornis (Studer). *c*, carapace, denuded. *d*, ventral view of right peduncle of antenna 2 (the apical process of 3rd joint may be single or bifid).
Cryptodromia oktahedros Stebb. *e*, carapace. *f*, 5th leg.
Cryptodromia monodous Stebb. *g*, carapace. *h*, 5th leg.
(*e*, *f*, *g*, *h* after Stebbing.)

mud and sand entangled in the fur, and probably the crabs lie buried in the soft ooze. Sometimes the tubes of Serpulid worms are attached to the large chelipeds of the ♂, showing that the chelipeds at least are held above the surface of the mud.

Common off the west coast on the Stock-fish grounds, but rare east of Cape Point. Associated with *E. bicornis*, and the Oxyrhynch crabs *Scyramathia hertwigi* and *Achaeopsis thomsoni*.

Exodromidia bicornis (Studer)

Fig. 62, *c*, *d*.

1910. Stebbing, *l. c.*, p. 343 (*Dromidia* (?) *b.*).

Covered with rather short stiff pile, with longer bristles towards edges of carapace and on chelipeds and legs. Carapace about as broad as long, regions not defined. Front with 2 divergent, more or less upwardly directed slender spiniform processes, bearing spinules and setae, median tooth acute, much smaller, at a lower level. Supra-orbital and antero-lateral margins with small white spinules, varying in number; similar spinules scattered over carapace, chiefly towards the margins. Terminal abdominal segment ♂ nearly as long as broad, triangular, ending in a sharp point. Sternal grooves ♀ ending together on a tubercle on suture between chelipeds and 2nd legs. Third joint of peduncle of ant. 2 with a spinous process, which may be simple or bifid. Chelipeds larger in ♂ than in ♀, 2 strong tubercles on upper apex of wrist. 4th–6th joints of chelipeds and 2nd and 3rd legs with scattered conical tubercles and spinules. Fifth leg subequal to 4th, in both 6th joint with a horny spine on inner apex opposing dactyl, but none on outer apex. A strong white spine on coxal joint of 2nd leg ♂. No epipods on chelipeds or legs. Eggs large, 1·5–2 mm. in diam., not numerous.

Length (to tip of median frontal point) up to ♂ 20, ♀ 16 mm., breadth ♂ 18, ♀ 15 mm., cheliped ♂ 57, ♀ 25 mm. Reddish (Studer).

Localities.—South of the Cape, 117 fathoms (Studer); Agulhas Bank, 150 fathoms (Henderson); off Table Bay and Cape Point, 106 and 318 metres, St. Francis Bay (Doflein); off Cape Point, 166 fathoms (Stebbing); from off Saldanha Bay to Cape Point and southern slope of Agulhas Bank, 120–200 fathoms (S. Afr. Mus.).

Remarks.—On the same grounds and associated with *E. spinosa*, but much less abundant. Like *spinosa* this species seems to lie buried in the sand and mud.

Gen. Cryptodromia Stimpson

1910. Stebbing, *l. c.*, p. 344 (references, but not the one species thereunder included).

1913. Ihle, *l. c.*, pp. 32 (key to some of the species), 86, 90.

1918. Stebbing, Ann. Durban Mus., ii, p. 56.

1920. *Id.*, Ann. S. Afr. Mus., xvii, p. 251 (not the *n. sp.* there described).

1923. *Id.*, Fish. Mar. Biol. Surv., Rep. iii (for 1922), Spec. Rep. 3, p. 4.

Carapace convex, usually broader than long, regions usually well defined. Front bilobed, with median rostral point at a lower level. Sternal grooves ♀ ending apart, behind the cheliped segment. Legs knobbed or ridged. Fifth leg shorter than 3rd. No epipods on chelipeds or legs.

Key to the South African Species.

1. Carapace approximately octagonal in outline . . . *oktahedros.*
2. Carapace approximately circular . . . . . *monodous.*
3. Carapace pentagonal . . . . . [*pentagonalis*].

C. pentagonalis Hilg. (1878, MB. Ak. Wiss. Berlin, p. 814, pl. 2, figs. 1, 2) from Ibo, Portuguese East Africa (also Mauritius and India: Henderson, 1893: Dar-es-Salaam: Ortmann, 1894), is a species which probably occurs also south of 15° S. lat. within our region.

Cryptodromia oktahedros Stebb.

Fig. 62, *e*, *f*.

1923. Stebbing, *l. c.*, p. 4, pl. 12.

Front with the median tubercle smaller than the frontal lobes and somewhat depressed. Greatest breadth of carapace in the anterior half, the postero-lateral margins nearly straight and converging. Anterior portion of carapace tuberculate, tubercles also on sub-hepatic region (see Stebbing's figures). Chelipeds and legs knobbed. 6th joint of 4th and 5th legs very short, with a spine on inner, but not on outer, apex. Sternal grooves ♀ ? (the description and figure are not clear on this point). Epipods ?.

Length 11·5 mm., breadth 11 mm. (non-ovig. ♀).

Locality.—Durban (Stebbing).

Remarks.—There is a certain likeness in the figure to *C. nodulifera* Hend. (*Challenger* Rep., xxvii, pl. 1, fig. 3) from the Australian coast. Possibly the same as *tomentosa* (see Hilgendorf, 1878, *l. c.*, pl. 2, figs. 3–5), of which *hirsuta* Borrad. 1903 may be a synonym.

Cryptodromia monodous Stebb.

Fig. 62, *g*, *h*.

1918. Stebbing, *l. c.*, p. 56, pl. 8.

Covered with short pubescence. Carapace strongly convex, smooth. Frontal lobes rounded, not so prominent as the depressed but slightly

up-turned rostral point. Antero-lateral margin with 6–8 (the type was asymmetrical) small teeth; no supra-orbital tooth. Sternal grooves ♀ ending apart between bases of 2nd legs. Chelipeds and legs knobbed. 5th leg longer than 4th, in both 6th joint short, with spine on inner, but not on outer, apex. Epipods ?.

Length 21 mm., breadth 20 mm. (♀ with ova in oviducts). Reddish.

Locality.—Durban (Stebbing).

Remarks.—Cf. *octodentata* (Rathbun, 1923, Biol. Res. "Endeavour," v, p. 151, pl. 41; and Hale, 1927, S. Austral. Crust., pt. 1, p. 107, fig. 103; also de Man's figure of *caput-mortuum*, 1887, Arch. Naturg., liii, pl. 17, fig. 5).

Gen. Cryptodromiopsis Borrad.

1903. Borradaile, Ann. Mag. Nat. Hist. (7), xi, p. 299.

1903. *Id.*, F. Geogr. Mald. Laccad. Archip., ii, p. 578.

Carapace convex, usually broader than long, regions usually ill-defined. Front bilobed, with median rostral point at a lower level. Sternal grooves ♀ ending together between chelipeds. Legs knobbed or ridged. Fifth leg shorter than 3rd. No epipods on chelipeds or legs.

Remarks.—Separated from *Cryptodromia* on account of the converging sternal grooves in ♀. It is doubtful whether a spine on outer apex of 6th joint of 5th leg can be regarded as a generic character.

Key to the South African Species.

1. Frontal teeth not prominent. 6th joint of 5th leg more than twice as long as wide. Carapace smooth . . . *spongiosa.*
2. Frontal teeth prominent, overhanging the rostral point. 6th joint of 5th leg not twice as long as wide. Carapace areolate, granulate or tuberculate.
   - *a.* Carapace tuberculate and granulate, covered with setiform hairs . . . . . *bituberculata.*
   - *b.* Carapace areolate only, covered with imbricate scales . *lepidota.*

Cryptodromiopsis spongiosa (Stimpson)

Fig. 63, *a–c.*

? 1865. Heller, Novara Crust., p. 72 (*Dromidea s.*).

? 1884. Miers, Zool. H.M.S. *Alert*, Crust., p. 552, pl. 50, fig. A (? var. *stimpsonii*).

1910. Stebbing, *l. c.*, p. 343 (*Dromidia s.*).

1913. Balss, Schultze Reise, v, p. 109.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 251, pl. 22 (Crust., pl. 102) (*Cryptodromia micronyx*).

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 47 (*Dromidia s.*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 369.

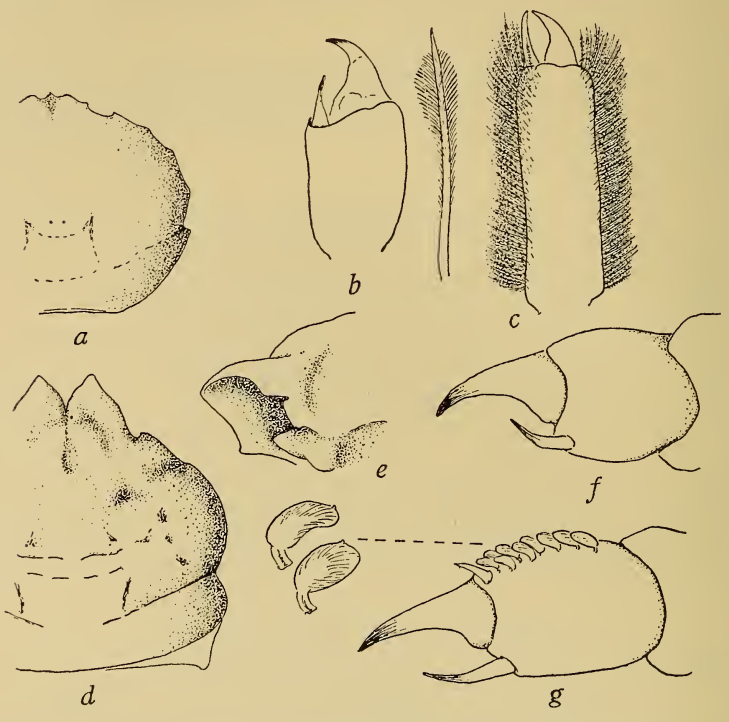


Fig. 63.—*Cryptodromiopsis spongiosa* (Stimpson). *a*, carapace, denuded. *b*, *c*, 6th joint and dactyl of 4th and 5th legs respectively, with seta from leg. *Cryptodromiopsis lepidota* Brnrd. *d*, carapace, denuded, the unshaded triangular area is membranous. *e*, lateral view of front. *f*, *g*, 6th joint and dactyl of 4th and 5th legs respectively, the scaly covering only partly represented, and two scales further enlarged.

Covered with a very short close and thick pile ("sponge-like," Stimpson). Carapace globose, smooth. Frontal lobes short, rounded; median rostral point subequal but strongly deflexed. A blunt supra-orbital tooth. Antero-lateral margin with 4 rounded undulations, the hindermost one forming a blunt knob behind branchial groove. Regions ill-defined, but grooves defining cardiac region distinct. Terminal abdominal segment ♂ broader than long, triangular, ending in a sharp point. Chelipeds and legs knobbed. Fifth leg longer and

more slender than 4th, its 6th joint (when denuded) almost 3 times as long as wide; dactyl in both legs very small, a horny spine on inner but not on outer apex of 6th joint. No spine on coxal joint of 2nd leg ♂. Sternal grooves ♀ ending together between chelipeds. No epipods on chelipeds or legs. Eggs large, 1·5–2 mm. in diam., not numerous.

Length up to ♂ 13, ♀ 13·5 mm., breadth ♂ 16, ♀ 15 mm. Reddish orange, finger and thumb of chelipeds crimson with white tips.

Localities.—False Bay, 10–20 fathoms (Stimpson, Henderson); Luderitzbucht (Balss); off Cove Rock, East London, 22 fathoms (Stebbing); Saldanha Bay, False Bay, Hermanus, Mossel Bay, and off East London, 9–85 fathoms (S. Afr. Mus.).

Distribution.—St. Paul Is., Indian Ocean (Heller; see Henderson's comment).

Remarks.—Two ♂♂ from False Bay agree in all respects with the 2 ♀♀ returned by Stebbing as *micronyx*. It is probable that if Stebbing had seen examples from False Bay he would have recognized Stimpson's species. Stimpson described the 4th leg as "truncate at the tip," which exactly expresses the appearance of this leg when seen with the naked eye and not denuded of its furry covering; his representation of the 6th joint of the 5th leg is certainly not correct. The explanation seems to be that the right-hand side of the figure is drawn with the setose covering, and with the 6th joint of 5th leg somewhat foreshortened; the left-hand side is drawn as denuded of the covering, but the legs are drawn as of the *same thickness* as those on the right side (except the 4th joint of 5th leg), thus giving a false impression. The ventral view of the front corresponds with Henderson's figure.

Miers' var. *stimpsonii* from Mozambique requires further investigation.

According to Ihle (*l. c.*, p. 31) this species was studied by Bouvier (1896, Bull. Soc. Philom. Paris (8), viii, p. 55). I have not seen the paper.

Cryptodromiopsis bituberculata (Stebb.)

1920. Stebbing, *l. c.*, p. 254, pl. 23 (Crust., pl. 103) (*Eudromia b.*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 369.

Whole surface (including ventral surface of 3rd and 4th joints of mxp. 3) granulate. Carapace, chelipeds and legs with a thin, feeble covering of short stiffish hairs, sometimes nearly obsolete. Carapace pentagonal, areolate; frontal lobes prominent, the median rostral tooth strongly deflexed, small, acute. A pair of prominent rounded tubercles on gastric region (not always as strongly developed as in the

type), and a less conspicuous pair behind them. Lateral margin with a large conical tubercle behind cervical groove, and a smaller one behind branchial groove. Inner portion of anterior branchial region often surmounted by a small tubercle. Chelipeds and legs nodulose as well as granulate. Terminal abdominal segment ♂ ending in a sharp point (bifid in one case). Sternal grooves ♀ ending together between bases of chelipeds. No spine on coxal joint of 2nd leg ♂. 5th leg shorter than 4th, both with a small dactyl impinging against a spine on inner apex of 6th joint. Anterior margin of 4th joint of mxp. 3 *gibbous, white and polished.* No epipods on chelipeds or legs.

Length (incl. frontal lobes) up to ♂ 14, ♀ 15 mm., breadth ♂♀ 17 mm. (incl. lateral processes).

Localities.—False Bay, 18 fathoms (Stebbing); Algoa Bay, off Gt. Fish Point, and off East London, 16–22 fathoms (S. Afr. Mus.).

Remarks.—This species conflicts with the diagnosis of *Eudromia*, as Stebbing himself said (p. 253); it is obviously closely allied to the Indian *C. gilesii* Alck. (1901, Cat. Ind. Decap. Crust., i, p. 54, pl. 3, fig. 13), but is even more strongly sculptured.

Cryptodromiopsis lepidota Brnrd.

Fig. 63, *d–g.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 369.

Covered with a soft close tomentum consisting of imbricate, scale-like battledore-shaped "hairs." Carapace areolate, smooth, not granulate, subpentagonal, about as long as wide. Frontal teeth prominent, triangular, overhanging the small rostral point. No supra-orbital tooth, infra-orbital tooth weak; supra-sutural hump distinct, but region between it and orbital notch concave. Antero-lateral angle rounded; lateral margin distinctly notched at branchial groove, but without tooth. Sternal grooves ♀ apparently ending together (specimen immature). Chelipeds and 2nd and 3rd legs knobbed. Fourth and 5th legs stout, 5th slightly the longer; 6th joint of 4th leg globose, with spine opposing dactyl; 6th joint of 5th leg oblong, with spine on both inner and outer apices. No epipods on chelipeds or legs.

Length (incl. frontal teeth) 6 mm., breadth 6·5 mm.

Locality.—Off Hood Point Lighthouse, near East London, 49 fathoms, 1 immature ♀ (S. Afr. Mus.).

Remarks.—The imbricate scale-like covering seems to be peculiar to this species and *Speodromia platyarthrodes.*

Gen. Speodromia Brnrd.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 370.

In general like *Cryptodromiopsis*. Carapace with the gastric and branchial regions gibbous, the branchial region especially inflated owing to a deep cavity in the subbranchial region. This cavity is closed anteriorly by a lobate enlargement of the 4th joint of the cheliped (when flexed) and posteriorly by the 4th joints of the 2nd–4th legs (1st–3rd walking legs). Upper surface of carapace with sessile scale-like setae arranged more or less in a network or vermiculate pattern; margins of carapace, under surface, 3rd maxillipeds, chelipeds and legs with longer clavate and spiniform setae. Front obscurely tridentate. Sternal grooves ♀ ending together between bases of chelipeds. Tips of finger and thumb of cheliped hollowed, with interlocking teeth. The gills are phyllobranchiae, arranged as follows:—

	Podobranchs.	Arthrobranchs.	Pleurobranchs.
Mxp. 1	epipod	..	..
2	1+epipod	..	..
3	1+epipod	..	..
Prp. 1	..	2	..
2	..	1	1
3	..	1	1
4	..	1	1
5	..	..	1
	2+3 epipods	5	4=11+3 epipods

Remarks.—Stebbing made no comment on the remarkable cavities on the ventral surface of the branchial regions, which, together with the reduced branchial formula, are the reasons for instituting a separate genus.

Balss (1938, *l. c., infra*) has excluded Stebbing's species *platyarthrodes* from the genus *Dynomene*, giving reasons why he considered it a Dromiid. The statement, based on Stebbing's figures, that the tips of the finger and thumb of cheliped are pointed is not correct; they are typically Dromiid, with small interlocking teeth.

Speodromia platyarthrodes (Stebb.)

Fig. 64.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 59, pl. 17 (*Dynomene p.*).

1910. *Id.*, *l. c.*, p. 347 (*Dynomene p.*).

1938. Balss, Medd. Göteb. Mus., lxxv, p. 6.

Upper surface of carapace reticulate and vermiculate with low corrugations which are studded with minute sessile, scale-like setae (fig. 64, *b*); margins of carapace, under surface, chelipeds and legs with pedunculate, clavate setae (fig. 64, *c*) and setiform hairs, those on wrist and hand of cheliped arranged more or less reticulately or in groups. A thick fringe of clavate setae around the anterior margin of the subbranchial cavity (fig. 64, *a*, right side). Hind margin of 4th joint of cheliped laminately expanded, forming a prominent lobe distally. Uropods visible on external surface of abdomen in ♀ (*fide* Stebbing), but only on internal surface in ♂ and juv. ♀. In addition to the phyllobranchiae as given above, there are on the membranous inner wall of the branchial chamber, just above its junction with the calcified epimera, a group of 5 lobes bearing long setae, and a single lobe farther posteriorly. These lobes appear to be hollow, and connected through two apertures with the body cavity, but the condition of the specimens is too poor to determine with certainty whether they are connected with the circulatory system.

Length up to 26 mm., breadth 38 mm.

Localities.—"Off Cape Point, 650–700 fathoms" [*sic*] (Stebbing); Mossel Bay and Algoa Bay, 20–28 fathoms (S. Afr. Mus.).

Remarks.—The type ♀ was not returned to the South African Museum. There are, however, one ♂ from Mossel Bay, and 1 adult ♂, 1 juv. ♂, 1 juv. ♀ from Algoa Bay, which have been utilized in the above description.

The locality given by Stebbing is so remarkable that it is suggestive of other bottles having been broken in transit besides the one mentioned by Stebbing (1905, p. 60), with consequent mixing of labels. The Cape Point locality should, in my opinion, be deleted.

Family DYNOMENIDAE.

1910. Stebbing, *l. c.*, p. 346.

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, pp. 30, 51.

Carapace convex or flattish, subcircular. Sternal grooves ♀ very short. Only the last pair of legs reduced in size and subdorsal in

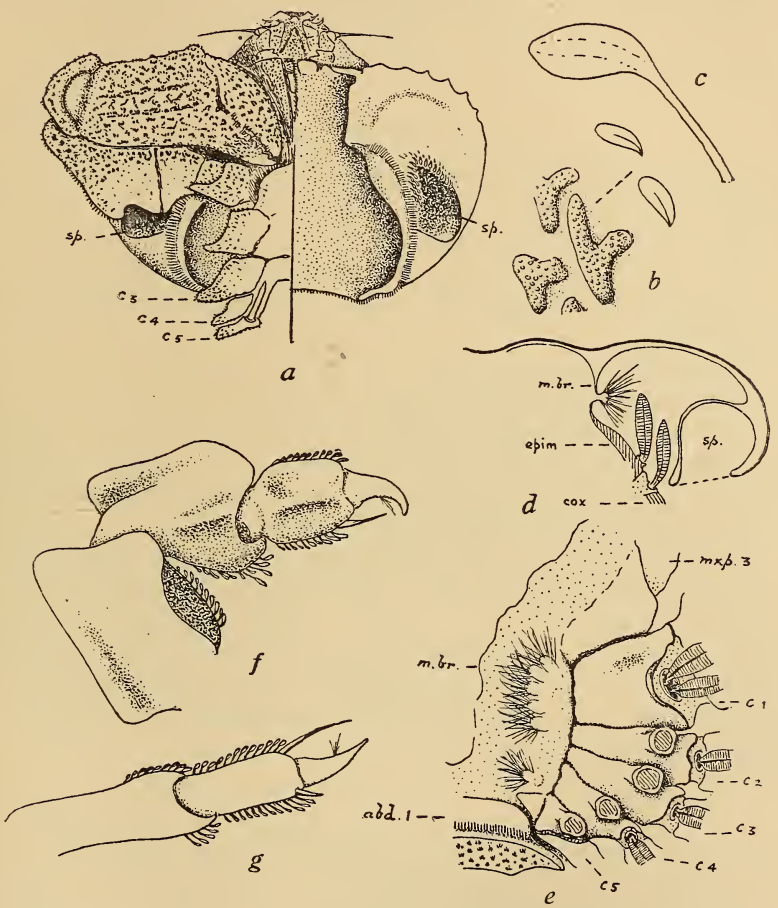


Fig. 64.—*Speodromia* Brnrd., *Speodromia platyarthrodes* (Stebb.). *a*, ventral view, left side showing mxp. 3, cheliped, and coxae 2–5 *in situ*, right side after removal of sternites and appendages. *b*, portion of carapace, with sessile scale-setae. *c*, stalked clavate seta from ventral surface. *d*, diagrammatic cross-section through branchial chamber and subbranchial cavity. *e*, view of inner wall of branchial chamber, arthrobranchs cut off short, pleurobranchs removed, setiferous lobes on membranous part of inner wall. *f*, 4th leg. *g*, 5th leg, marginal clavate setae only partly represented.

(*c* 1–5, 1st–5th coxae. *m.br.*, cut edge of membranous inner wall of branchial chamber. *sp.*, cavity in subbranchial region.)

position; 6th joint of 4th leg not subchelate, *i.e.* without a spine opposing the dactyl. Epipods typically present on chelipeds and next two legs. Vestiges of uropods present.

Gen. Dynomene Desm.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 58 (but not the *n. sp.* thereunder described).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 195.

1921. Stebbing, Ann. S. Afr. Mus., xviii, p. 456 (*Maxillothrix*).

1925. Odhner, Medd. Göteb. Mus., xxix, p. 85 (*Maxillothrix* = *Dynomene*).

1937. Rathbun, *l. c.*, p. 54.

1938. Balss, Medd. Göteb. Mus., lxxv, p. 6.

1942. Ward, Mauritius Inst. Bull., ii, p. 70.

Carapace flattish, subcircular, covered with soft pile. Front broadly and bluntly triangular, with medio-dorsal groove. Tips of finger and thumb of chelipeds spooned.

Remarks.—The branchial formula (1899, M. Edwards and Bouvier, Res. Sci. Camp. Monaco, xiii, p. 10) is said to be the same as that of *Homarus vulgaris* (*i.e.* 20 + 7 epipods). Alcock (1899, J. Asiat. Soc. Bengal, lxviii, p. 133, footnote) had insufficient material for complete dissection, but found that the gills were more numerous than in *Dromia*, etc. One of the South African specimens of *D. pilumnoides* shows the following formula:—

	Podobranchs.	Arthrobranchs.	Pleurobranchs.
Mxp. 1	epipod	..	..
2	1 + epipod	..	..
3	1 + epipod	..	..
Prp. 1	1	2	..
2	1	2	1
3	1	2	1
4	1	2	1
5	..	..	1
	6 + 3 epipods	8	4 = 18 + 3 epipods

I failed to find any epipods on the chelipeds or legs.

Dynomene pilumnoides Alck.

Fig. 65, *a–c.*

1899. Alcock, J. Asiat. Soc. Bengal, lxviii, p. 133.

1901. *Id.*, Cat. Decap. Crust. India, i, p. 35, pl. 1, fig. 2.

1921. Stebbing, *l. c.*, p. 457, pl. 14 (Crust., pl. 109) (*Maxillothrix actaeiformis*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 371.

Covered with a thick tomentum of short club-shaped setae, with groups of longer spiniform setae on various parts of carapace, and on chelipeds and legs. Carapace slightly broader than long, regions fairly well marked. Upper orbital margin with a feeble notch, lower border with a stronger notch near inner angle, and forming a short infra-orbital tooth on its outer side; outer orbital margin rounded. Antero-lateral margin with 5 sharp teeth, the hindmost the smallest and situate just behind the very feeble branchial groove. Chelipeds subequal, with small scattered tubercles on upper surfaces of 4th–6th joints, 2 larger tubercles on outer upper apex of wrist (5th), and a tuberculiform process, sometimes tridentate, on its inner margin (fig. 65, *b*). Upper and lower margins of 4th joint, and both upper margins of 5th joint of 2nd–4th legs with a few small denticles; upper apex of 4th joint rather prominent. Terminal abdominal segment ♂ and ♀ broadly rounded.

Length up to 11·5 mm., breadth 13·5 mm.

Locality.—Natal coast, 50 fathoms (Stebbing).

Distribution.—Laccadive Archipelago.

Remarks.—Stebbing's description and figure of five "lobules" instead of sharp teeth on the carapace border were due to his not cleaning off the tomentum.

It is probable that *pilumnoides* is really synonymous with *hispida* Desm., but Alcock (1901) distinguished his species from *hispida* and *pugnatrix* de Man by its non-serrate lower orbital border. As the present specimens also have only one small tooth on the lower orbital border, they are referred to Alcock's species.

Both *hispida* and *pugnatrix* have been recorded from Mauritius (*cf.* Ward, *l. c.*).

In the only ♂ of the four specimens in the South African Museum the abdomen does not agree with Stebbing's description and figure: the 1st segment is wider than 2nd, which is the shortest (as is also the case in ♀). Neither the figure of the ♂ abdomen nor that of the ♀ show the very distinct intercalated pieces representing the uropods.

The largest specimen is a ♀ but with no apparent sternal grooves.

Family THELXIOPEIDAE.

1910. Stebbing, *l. c.*, p. 347 (*Homolidae*).

1913. Ihle, Siboga Exp. monogr., xxxix, *b*, pp. 52 *sqq.* (*Homolidae* part; morphology and key to genera), 88, 92.

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 62.

Carapace more or less quadrangular. Basal joint of eye-stalk about the same length as distal joint (including cornea). Epipods on chelipeds and 2nd legs, or chelipeds and 2nd and 3rd legs. Flagellum of ant. 2 much longer than carapace. Mxp. 3 pediform. Gills 13–14.

Gen. Thelxiope Raf.

1814. Rafinesque, Précis des Découv., p. 21.

1815. Leach, Trans. Linn. Soc. Lond., xi, p. 324 (*Homola*).

1910. Stebbing, *l. c.*, p. 347 (*Homola*).

1937. Rathbun, *l. c.*, p. 62.

Carapace not depressed, hepatic spine some distance behind level of the unbranched supra-orbital spine. Mxp. 3 subpediform, outer margin of 4th joint dilated. Distal joint of eye-stalk (excl. cornea) shorter than the slender basal joint. Flagellum of ant. 2 long. Dactyl of 5th leg about half length of 6th and closing against a more or less distinct process at base of latter. Epipods on chelipeds and 2nd and 3rd legs. Gills 14 + 6 epipods.

Remarks.—The *linea homolica* (fig. 65, *d*, *l.h.*) is a dark, feebly calcified groove running dorsal to, and near the lateral margin of carapace, but is not always very distinct.

Key to the South African Species.

1. Rostrum bifid. Carapace with tubercles on anterior half.
   - *a*. Hind margin of 4th joint of 2nd–4th legs without spines *barbata.*
   - *b*. Hind margin (as well as front) of 4th joint of 2nd–4th legs with spines . . . . . *orientalis.*
2. Rostrum entire, spiniform. Carapace strongly spinose (*Moloha*) . . . . . *alcocki.*

Thelxiope barbata (Fabr.)

Fig. 65, *d*, *e*.

1910. Stebbing, *l. c.*, p. 347 (*Homola b.*).

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 48 (*Homola b.*).

1937. Rathbun, *l. c.*, p. 63, fig. 16, and pl. 15

Carapace pubescent, quadrate, slightly broader in front than behind. Rostrum bifid, with a tubercle at its base on each side. Two teeth, a larger and a smaller, on the lateral border between cervical

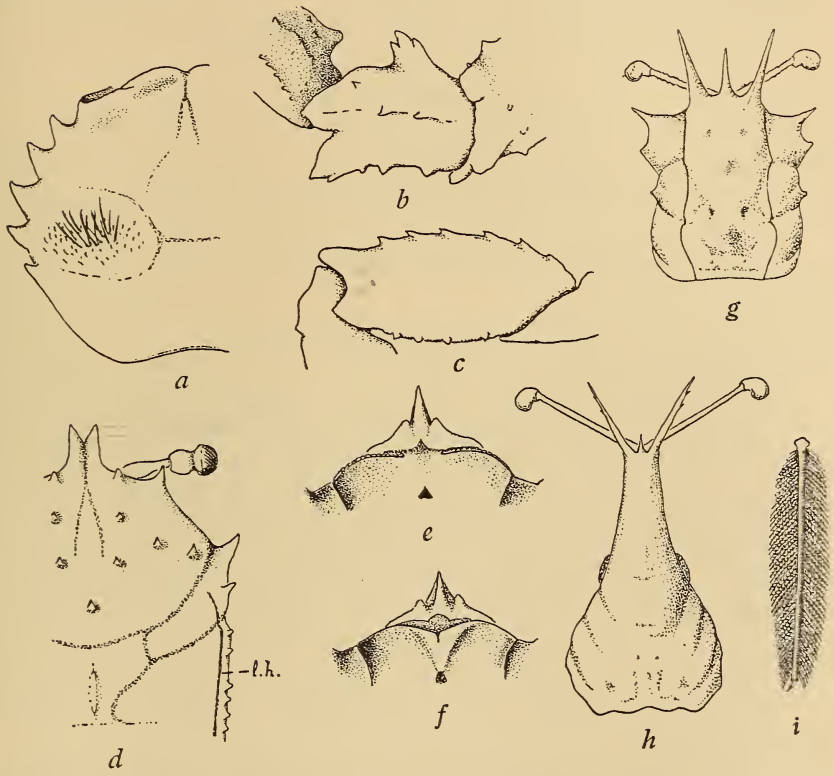


Fig. 65.—*Dynomene pilumnoides* Alck. *a*, carapace, most of setose covering removed. *b*, 5th joint (with apex of 4th and base of 6th) of cheliped. *c*, 4th joint of 2nd leg.
Thelxiope barbata (Fabr.). *d*, carapace. *l.h.*=linea homolica. *e*, epistomal spine and anterior part of buccal cavity.
Thelxiope orientalis (Hend.). *f*, epistomal spine and buccal cavity.
Latreillopsis bispinosa Hend. *g*, carapace.
Latreillia pennifera Alck. *h*, carapace. *i*, 6th joint and dactyl of 5th leg.

and branchial grooves. No spines on lower (hind) margin of 4th joint of 2nd–4th legs. 6th joint of 5th leg scarcely enlarged basally, but with a double row of stout spines between which the dactyl closes. The raised anterior rim of buccal cavity is interrupted medianly by a rather wide but shallow depression (fig. 65, *e*). Pleopods 1 and 2 ♂

stout; pleopod 2 apically truncate, with slightly expanded rim, like a piston.

Length up to 36 mm. (incl. rostrum), breadth 25 mm.

Localities.—False Bay, 32 fathoms (Stebbing); False Bay and off Cape Infanta, 46 fathoms (S. Afr. Mus.).

Distribution.—Mediterranean, Azores, West Indies.

Thelxiope orientalis (Hend.)

Fig. 65, *f.*

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 19, pl. 2, fig. 1 (*Homola o.*).

1901. Alcock, Cat. Ind. Decap. Crust., i, p. 61, pl. 4, fig. 20 (*H. andamanica*).

1904. Doflein, D. Tiefsee Exp., vi, p. 14, pl. 5, figs. 4, 5 (*H. barbata orientalis*).

1923. Rathbun, Biol. Res. "Endeavour," v, p. 143, pl. 37 (*Homola o.*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*H. andamanica*).

Differs from *barbata* as follows: tubercles at base of rostrum, supra-orbital spines, and denticles on hinder half of lateral margin of carapace smaller; only one tooth on lateral margin between cervical and branchial grooves, the first of the series of denticles on lateral margin being immediately behind the branchial groove. Lower (hind) margin as well as the front margin of 4th joint of 2nd–4th legs with spines. The raised anterior rim of buccal cavity medianly expanded into a slightly raised triangular area extending backwards to the median pit, with a small slit anteriorly. Pleopods 1 and 2 ♂ as in *barbata*.

Length 19 mm. (S. Afr. Mus.), 27 mm. (Alcock). Reddish (*Pieter Faure* log-book).

Localities.—Zululand coast, 75–90 fathoms (S. Afr. Mus.); Portuguese East Africa (26° 3′ S., 33° 4′ E.), 290 metres (Barnard).

Distribution.—Japan, Philippine Is., Kei Is., Andaman Is., S.E. Australia.

Remarks.—Although Henderson refers to the branchial groove as the cervical groove, his figure shows quite clearly that there is only one spine between the (true) cervical and the branchial grooves on the lateral border.

Doflein noticed the difference in the anterior rim of the buccal cavity in *barbata* and *orientalis*, but did not regard it as of specific value.

The two forms, which are here given specific rank, appear to inhabit separate regions in South African waters: the Atlantic form in False Bay and extending on the Agulhas Bank to Cape Infanta; the Indo-Pacific form not extending farther south than the coast of Zululand in the Mozambique current.

Subgen. *Moloha* Brnrd.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 371.

Carapace urn-shaped, widest across branchial regions, not depressed, *lineae homolicae* conspicuous and well within the lateral borders. Rostrum a simple spine. Chelipeds slender. 5th leg reaching to about end of 5th joint of 4th leg. No epipod (or a rudimentary one) on 3rd leg, and no arthrobranch on 4th leg; branchial formula thus 13 + 5 epipods.

Thelxiope (*Moloha*) *alcocki* (Stebb.)

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 255, pl. 24 (Crust., pl. 104) (*Latreillopsis a.*).

1924. *Id.*, *ibid.*, xix, p. 4 (*Latreillopsis a.*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*Latreillopsis a.*).

1947. *Id.*, *l. c.*, p. 372.

Each of the two spines immediately above the rostrum, but not the rostrum itself, with a subsidiary spine. The epistome has anteriorly 2 low ridges, and a more prominent median ridge, which abuts against the rostrum, and seen in lateral view is hatchet-shaped. The anterior rim of the buccal cavity has a slight median notch. The 2nd joint of eye-stalk nearly as long as 1st joint. Third (2nd free) joint of ant. 2 without apical processes or spines; 5th joint slightly shorter than 3rd and about half length of 4th (not one-quarter as in Stebbing's figure or one-fifth as in his text). Other features as in Stebbing.

	Podobranchs.	Arthrobranchs.	Pleurobranchs.
Mxp. 1	epipod	..	..
2	1 + epipod	1	..
3	epipod	2	..
Prp. 1	epipod	2	..
2	epipod	2	1
3	0 or rud. epip.	2	1
4	..	..	1
5	..	..	..
	1 + 5 epipods	9	3 = 13 + 5 epipods

There is a rudimentary epipod on 3rd leg on the left side only, no trace of such on the right side.

Length (incl. rostrum) 45 mm., breadth (across branchial region, excl. spines) 33 mm.

Localities.—Algoa Bay, 40 fathoms (Stebbing); Portuguese East Africa (25° 59′ S., 33° 6′ E.), 312 metres (Barnard).

Remarks.—The relative lengths of the joints of the eye-stalk, and the presence of epipods on the chelipeds and 2nd legs, show at once that this species has been wrongly assigned to *Latreillopsis*. There is a general resemblance to *L. multispinosa*, but the two species are not closely related as Stebbing (1924) thought.

This species might be included in *Paromola*, but the 5th legs are much shorter in the latter (sub)genus.

Besides the type ♀ in the South African Museum, only one other specimen is known (but see under *L. multispinosa*). At the time (1926) I contented myself with merely identifying the Portuguese East African specimen with Stebbing's type, and unfortunately the specimen is no longer accessible to me.

"*Latreillopsis*" *major* Kubo (1936, J. Imp. Fish. Inst., xxxi, p. 63, pl. 17) from Japan may be synonymous, but Kubo gives a different gill formula. In view of Stebbing's error in regard to the length of 4th joint of ant. 2, noted above, the supposed specific difference mentioned by Kubo falls away. No comparison is made with "*Latreillopsis*" *hawaiiensis* Edmondson (1932, Occasion. Pap. Bernice P. Bishop Mus., ix, no. 24, p. 5, fig. 1 and pl. 1). Edmondson does not mention the gill formula of his species.

Family LATREILLIIDAE

1910. Stebbing, *l. c.*, p. 347.

1913. Ihle, Siboga Exp. monogr., xxxix, *b*, pp. 52 (*Homolidae* part), 69 (in key), 88, 93.

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 73.

Carapace quadrangular or piriform. Basal joint of eye-stalk much longer than distal joint. No epipods on chelipeds or legs. Flagellum of ant. 2 not as long as carapace. Mxp. 3 suboperculiform. Gills 8.

Key to the Genera.

1. Carapace quadrilateral . . . . . *Latreillopsis.*
2. Carapace piriform, anterior portion forming a long "neck" . *Latreillia.*

Gen. Latreillopsis Hend.

1913. Ihle, *l. c.*, p. 77.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 255 (not the *n. sp.* there described).

Carapace more or less quadrangular, not depressed. Rostrum spiniform, flanked on either side by a long supra-orbital spine. Mxp. 3 with 4th joint dilated on outer margin, the antero-external angle sharply quadrate. First joint of eye-stalk slender, elongate. Flagellum of ant. 2 long. Chelipeds and legs very slender; 6th and 7th (dactyl) joints of 5th leg as in *Thelxiope*.

Remarks.—Although accepted as a species of this genus by Ihle, I think *L. petterdi* Grant 1905 (see also McCulloch, 1907, and Rathbun, 1923) should be re-examined as regards its branchial formula.

Key to the South African Species.

1. Carapace with few spines . . . . . *bispinosa.*
2. Carapace with numerous spines . . . . . *multispinosa.*

Latreillopsis bispinosa Hend.

Fig. 65, *g*.

1901. Alcock, Cat. Ind. Decap. Crust., i, p. 73, pl. 7, fig. 26.

1913. Ihle, *l. c.*, p. 77.

1924. Stebbing, Ann. S. Afr. Mus., xix, p. 4.

In addition to the supra-orbital spines, there are laterally 2 on the hepatic region, and one between the cervical and branchial grooves; dorsal surface with tumid regions, and sometimes minute tubercles. A median tubercle on each of abdominal segments 2–5 (the last very small) and on posterior margin of 6. Third (2nd free) joint of peduncle of ant. 2 with a spine on both inner and outer apices.

Length (incl. rostrum) 12 mm. (Doflein: 16 mm.).

Localities.—Natal coast, 85 [not 35] fathoms (Stebbing); off Cape Morgan, 77 fathoms (S. Afr. Mus.).

Distribution.—Japan, Philippine Is., Kei Is., Andaman Sea.

Latreillopsis multispinosa Ihle

1912. Ihle, Tijdschr. Ned. Dierk. Ver. (2), xii, p. 211.

1913. *Id.*, *l. c.*, p. 78, pl. 4, figs. 19–21.

? 1923. Stebbing, Fish. Mar. Biol. Surv., Rep. iii (for 1922), Spec. Rep. 3, p. 5.

The supra-orbital spines are as long as the carapace and bear one or two small subsidiary branches. Strong spines on the dorsal and lateral parts of carapace. A median tubercle on each of abdominal segments 2–5 and apex of 6. Mxp. 3 with 3rd and 4th joints each with a spine.

Length (excl. rostrum) 23 mm. (Ihle); Stebbing's specimen 45 mm.

Locality.—Natal coast, 130 fathoms (Stebbing).

Distribution.—Kei Is., 204 metres.

Remarks.—I have a strong suspicion that the specimen on which the South African record of this species is based was really another specimen of Stebbing's own "*Latreillopsis*" *alcocki*; but until the specimen can be found and re-examined, the record of Ihle's species must remain on the fauna-list.

Gen. Latreillia Roux.

1910. Stebbing, *l. c.*, p. 347.

1913. Ihle, *l. c.*, p. 81.

1937. Rathbun, *l. c.*, p. 73.

Carapace piriform, the anterior portion narrowed to form an elongate "neck," the hinder portion not covering the bases of the legs. Rostrum spiniform, deflexed between the two long divergent supra-orbital spines. Basal joint of eye-stalk very slender, and much longer than 2nd joint. Mxp. 3 with 4th joint not strongly dilated. Flagellum of ant. 2 short. Chelipeds and legs very long and slender; 5th leg not subchelate, the dactyl being very short, and the 6th joint fringed with plumose setae on both margins like a feather (fig. 65, *i*). 4th–6th abdominal segments in ♀ fused (but showing faint sutures).

Latreillia pennifera Alcock

Fig. 65, *h*, *i*.

1901. Alcock, Cat. Ind. Decap. Crust., i, p. 71, pl. 7, figs. 27, 27, *a*, *b*.

1910. Stebbing, *l. c.*, p. 347 (*elegans*, non Roux).

1911. Rathbun, Trans. Linn. Soc. Lond., xiv, p. 196.

1913. Ihle, *l. c.*, p. 82.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*elegans*, non Roux).

1947. *Id.*, Ann. Mag. Nat. Hist. (xi), 13, p. 372.

No median spine on the "neck." Three small, more or less distinct tubercles in a triangle on cardiac region (the median one posterior). A median spine on 2nd and 3rd abdominal segments in ♀, and a lateral one on each side on anterior margin of 4th segment. Fifth leg reaching well beyond the end of 4th joint of 4th leg.

Length (incl. rostrum) up to 15 mm. Narrow reddish longitudinal stripes on carapace, legs banded alternately red and white.

Localities.—Natal coast, 25 fathoms (Stebbing); Durban and Zululand coast, 36 fathoms (S. Afr. Mus.); Portuguese East Africa (25° 55′ S., 33° 4′ E.), 37 metres (Barnard).

Distribution.—Bay of Bengal, Gulf of Martaban, Mergui Archipelago, Kei Is., Seychelles.

Remarks.—Stebbing (1902, Mar. Invest. S. Afr., ii, p. 25) discussed the synonymy of *valida*, *elegans*, and *pennifera*, and recorded a South African specimen under the name *elegans*. Ihle, without specifying the differences between *elegans* and *pennifera*, records specimens of the latter from the Kei Islands, and states that the former is restricted to the Atlantic and Mediterranean.

OXYSTOMATA.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 434 (key to families).

1907. *Id.*, Ann. Mag. Nat. Hist. (7), xix, p. 478 (key to families).

1910. Stebbing, *l. c.*, p. 333.

1922. Bourne, J. Linn. Soc. Lond., xxxv, pp. 25–73 (*passim:* morphology).

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, pp. 75–258.

Buccal cavity produced forwards, more or less triangular in shape, epistome usually said to be reduced or absent (see Remarks). Exhalant branchial canals closed in by the elongate endopods of mxp. 1 (see Remarks). Female genital openings usually sternal. Gills 6–9 on each side. First pair of pleopods absent in female.

Remarks.—Bourne gives reasons for removing the *Raninidae* to a separate group (*infra*, p. 396). He also shows (*l. c.*, pp. 43 *sqq.*) that, so far from the "epistome" being reduced or absent, the triangular buccal cavity is in fact chiefly made up of the antennary sternite, *i.e.* it is the epistome.

Rathbun, apparently following Alcock, says that it is the exopod, instead of the endopod, of the 1st maxilliped which closes the exhalant branchial canals.

Key to the Families.

1. Carapace of usual crab-like shape.
   a. Inhalant branchial openings in front of chelipeds (fig. 67, *i*). Gills 9. Male genital openings coxal. Pleopod 2 ♂ elongate . . . . . *Calappidae.*
   b. Inhalant branchial openings at bases of external (3rd) maxillipeds (fig. 68, *a*). Gills less than 9. Male genital openings sternal. Pleopod 2 ♂ short . *Leucosiidae.*
2. Carapace subquadrilateral or subcircular, short, leaving the first 2 or 3 abdominal segments exposed. Last 2 pairs of legs dorsal in position, ending in hook-like dactyls . *Dorippidae.*

Family CALAPPIDAE.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 478.

1910. Stebbing, *l. c.*, p. 333, and p. 335 (*Matutidae*).

1918. Ihle, Siboga Exp. monogr., xxxix, *b* 2, pp. 161–186, and pp. 297–301, 307, 308 (morphology, systematics).

1922. Bourne, J. Linn. Soc. Lond., xxxv., pp. 52–55 (morphology).

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 196.

Carapace of usual crab-like shape. Inhalant branchial openings in front of the chelipeds. Antenna 2 small. Gills 9. Male genital openings coxal. Pleopod 2 ♂ more or less elongate.

Key to the South African Genera.

1. Mxp. 3 not completely closing the buccal cavity, distal joints (palp) not concealed (*Calappinae*).
   a. Walking legs concealed under postero-lateral expansions of carapace (fig. 66, *a*) . . . . . *Calappa.*
   b. Walking legs not concealed, no postero-lateral expansions of carapace (fig. 67, *a*) . . . . *Mursia.*
2. Mxp. 3 completely covering the buccal cavity, palp concealed (fig. 67, *i*). Legs natatory, distal joints flattened and expanded (*Matutinae*) (fig. 67, *h*) . . . . *Matuta.*

Gen. Calappa Fabr.

Box Crabs; Shame-face Crabs.

1910. Stebbing, *l. c.*, p. 333.

1918. Ihle, *l. c.*, p. 181.

1928. Monod, Bull. Soc. Sci. Nat. Maroc., viii, p. 109.

1937. Rathbun, *l. c.*, p. 197 (credited to Weber; unacceptable).

Carapace strongly convex, rounded in front, posteriorly with a

wing-like expansion on each side, under which the walking legs can be withdrawn and concealed. Orbits small, subcircular, lower margin complete (not notched), inner angle open but filled by the stout and often expanded basal joint of ant. 2. Mxp. 3 leaving exposed the anterior (calcified) prolongations of the endopods of mxp. 1, which form the floor of the exhalant branchial channels. Chelipeds very large, subequal, fitting closely over the mouth-parts, 4th joint strongly keeled on its lower outer margin; finger of the slightly larger (right *) cheliped with a strong knob-like process on outer basal surface, opposed to large molariform tubercle on base of thumb. Abdomen in adult ♂ with 3rd–5th segments fused. Pleopod 2 ♂ not as long as pleopod 1.

Remarks.—Miers' record of the American and Bermudan species *flammea* from Simon's Bay seems to be due to an error in labelling, and is omitted from the South African fauna-list (see also p. 3).

C. moniziana (see Stebbing, *l. c.*, p. 334) is also not admissible on account of doubts as to locality and specific identity.

Odhner (1923, Medd. Göteb. Mus., xxxi, pp. 16, 17, pl. 2, figs. 1, 2) records *pelii* Herklots, and *rubroguttata* Herklots, from Port Alexander. Balss (1921) regarded both as synonyms or varieties of the Mediterranean *granulata*. Not having seen actual specimens of these forms, I do not include them in the key, but refer to Odhner's figures.

It is possible that the fingers of the chelipeds rubbing against one another may be used for stridulating, but there is no special granulate ridge opposing the fingers as there is in *Mursia* (and *Acanthocarpus*, see Rathbun, 1937).

No specific difference in 1st pleopods ♂ of *hepatica* and *lophos*, the only two species of which I have seen males (*cf.* Stephensen, 1945, *l. c.*, *infra*, p. 66).

Key to the South African Species.

1. A distinct re-entrant angle or sinus between antero-lateral margin and lateral wing-like expansion of carapace (fig. 66, *a*). Eye-stalks slender, non-granulate.
   - *a*. Serrations on antero-lateral margin, lateral expansion, and outer margin of wrist of cheliped blunt . . *hepatica*.
   - *b*. These serrations sharp, spiniform . . . . var. *spinosissima*.
2. Antero-lateral margin passing gradually into the lateral expansion or with only a slight emargination (fig. 66, *e*, *j*, *n*). Eye-stalks stout, granulate (fig. 66, *g*, *o*).

* Miers' figures (1886, Rep. H.M.S. *Challenger*, xvii, pls. 23, 24) may be mirror-pictures due to reversal in the lithographing process. In *C. hepatica spinosissima* I have seen two "sinistral" specimens in 20 specimens.

a. A deep cavity on either side of gastric region. Front projecting prominently beyond orbits . . *gallus*.

b. Carapace evenly convex. Front not extending much beyond orbits.

i. Hand of cheliped with ridge and smooth groove running from base to molariform tubercle on thumb, lower border basally smooth (fig. 66, *m*) . . . . . *lophos*.

ii. Hand of cheliped without ridge and groove, granulate all over, including whole of lower border . . . . . *japonica*.

Calappa hepatica (Linn.)

Fig. 66, *a–d*.

1878. Hilgendorf, MB. Ak. Wiss Berlin, p. 809.

1884. Miers, Zool. H.M.S. *Alert*, Crust., p. 550.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 436, pl. 22, fig. 6.

1910. Stebbing, *l. c.*, p. 333.

1917. *Id.*, Ann. Durban Mus., ii, p. 19 (*spinosissimus*).

1918. Ihle, *l. c.*, p. 183, fig. 80 (buccal area).

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 373.

1938. Balss, Medd. Göteb. Mus., lxxv, p. 8.

Length of carapace a little over $\frac{1}{2}$, sometimes nearly $\frac{2}{3}$, extreme width. Front not prominent, bluntly triangular, with dorsal groove forming an apical notch, smooth ventrally. Carapace evenly convex, anteriorly with low blunt tubercles, posteriorly with short transverse rows of granules; antero-lateral margins dentate; 4 teeth on lateral expansion, which is separated from antero-lateral margin by a distinct sinus, 2–3 small notches on postero-lateral margin, from which run beaded ridges; posterior margin beaded, without projections. Eye-stalks long, slender, smooth. Suborbital margin semicircular, fringed with setae, the area behind it forming a smooth and slightly concave surface. Epistome (small plate between basal joints of 1st antennae) broader than long. Lateral ridge bordering exhalant canal not prominent, evenly convex; median septum evenly, but anteriorly rather strongly, convex (fig. 66, *c*). Basal joint of ant. 2 strongly produced into orbit, especially its upper distal corner. Pterygostomial region, and ridge below antero-lateral margin, thickly setose. Lower outer border of wrist of cheliped with 4 bluntly rounded lobes, of which the penultimate may bear a small tooth.

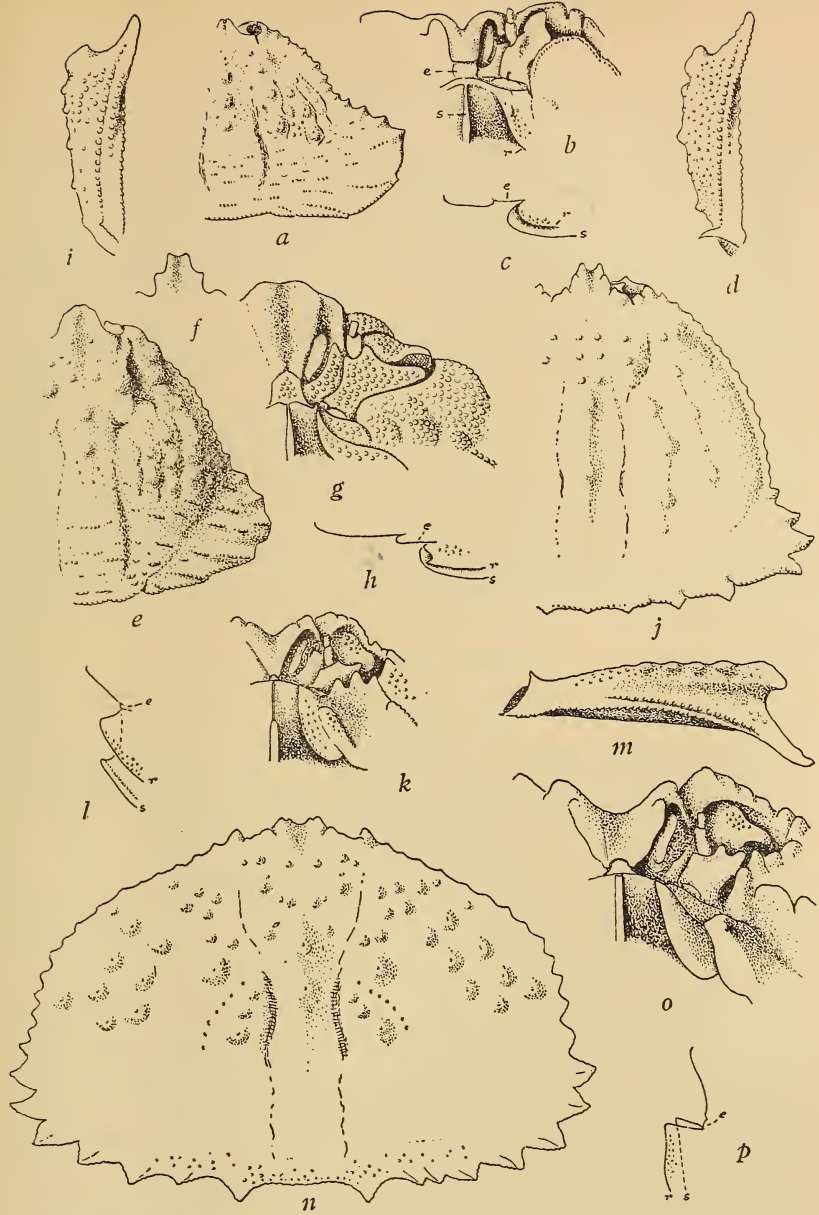


FIG. 66.—*Calappa hepatica* (Linn.). *a*, carapace. *b*, ventral view of front. *c*, profile of epistome (*e*), endostomial septum (*s*) and ridge bordering exhalant canal (*r*). *d*, ventral view of right chela of var. *spinosissima*.

Calappa gallus (Herbst). *e*, carapace (length slightly exaggerated to show both front and hind margin in same plane). *f*, front of juv. *g*, ventral view of front. *h*, profile as in *c*. *i*, ventral view of right chela.

Calappa lophos (Herbst). *j*, carapace ♂ (length slightly exaggerated as in *e*). *k*, ventral view of front. *l*, profile as in *c*. *m*, ventral view of right chela.

Calappa japonica Ortm. *n*, carapace ♀. *o*, ventral view of front. *p*, profile as in *c*.

Lower border of hand of larger cheliped as in *gallus*, but with a dentiform tubercle at base on outer surface.

Length up to 45 mm., breadth 80 mm. Mottled grey.

Localities.—Durban Bay (Krauss, Stebbing, and S. Afr. Mus.); Mozambique (Hilgendorf, Miers, and coll. K. H. B.); Delagoa Bay (coll. van der Horst).

Distribution.—East coast of Africa, Red Sea, Mauritius, Madagascar, Indo-Pacific, Australia.

Remarks.—The teeth on the antero-lateral margin and around the lateral expansion tend to become sharp up-turned spines in the form *spinosissima* M. Edw.; the distal 2 lobes on the lower outer margin of wrist both bear a spiniform denticle, and the tubercle at base of hand is larger and spiniform (fig. 66, *d*). Amongst the Mozambique specimens are typical *hepatica* and transitional forms to *spinosissima*. The latter clearly can be regarded only as a variety.

Calappa gallus (Herbst)

Fig. 66, *e–i*.

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 146.
1918. Ihle, *l. c.*, p. 181, figs. 81, 85 (buccal cavity, orbit, antennae).
1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 50.
1937. Rathbun, *l. c.*, p. 214, pl. 65, figs. 2, 3.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 372.

Length of carapace $\frac{3}{4}$ to nearly $\frac{5}{6}$ extreme width. Front projecting prominently beyond orbits, with 4 teeth, distinct in juv., but very blunt and obscure in adult; ventrally with shallow median groove (more distinct in juv. than in ad.). Carapace very convex, with a deep cavity on either side of gastric region, and deep grooves between branchial and cardiac regions; anterior portion of carapace with blunt tubercles, of which a medio-gastric and one on either side in advance of it are usually the largest and most prominent, posterior portion with short transverse beaded ridges; antero-lateral margin crenulate in adult, more sharply dentate in juv.; lateral expansions with (3–)4 teeth; 2–3 short teeth, from which run beaded ridges, on postero-lateral margin; posterior margin beaded but without teeth or projections. Eye-stalk granulate. Suborbital region with 4 teeth, one bordering orbit and 3 below it, distinct and more or less sharp in juv., very blunt or obsolete in adult. Epistome longer than broad. Lateral ridge bordering exhalant branchial canal prominent, ending in a point, sharper in juv. than in adult; median septum evenly convex

to anterior border of the canals. Basal joint of ant. 2 widely expanded distally, especially at hinder outer angle. Pterygostomial region not very thickly setose, but with thick fringe below antero-lateral margin. Lower outer margin of wrist with 4 rounded lobes, only feebly dentate in juv. Lower border of hand of larger cheliped smooth between 2 beaded ridges, with distally an intermediate row of granules, no marked groove or concavity between lower margin and the molariform process at base of thumb; no tooth or spine at base of outer surface of hand.

Length up to 54 mm., breadth 70 mm. Smallest specimen examined 11 mm. in length.

Localities.—Off Port Shepstone and Tongaati River mouth, 24–36 fathoms (S. Afr. Mus.).

Distribution.—Red Sea, Indo-Pacific. Also West Africa, and east coast of America from Florida to Brazil (see Balss and Rathbun).

Calappa lophos (Herbst)

Fig. 66, *j–m.*

1896. Alcock, *l. c.*, p. 144.

1918. Ihle, *l. c.*, p. 182.

1923. Rathbun, Biol. Res. "Endeavour," v, p. 137.

1933. Chopra, Rec. Ind. Mus., xxxv, p. 28.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 65, fig. 5, A, B (plp. 1, 2 ♂).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 372.

Length about $\frac{2}{3}$ extreme width. Front not projecting far beyond orbits, bifid, with a tubercle on each side behind the apical one, dorsally grooved, ventrally embracing the very small and (in adult) indistinct epistome (fig. 66, *k*). Carapace evenly convex, gastric and cardiac regions bounded by grooves, some low rounded tubercles anteriorly, 3–4 indistinct median ones on gastro-cardiac region, and in 2 rows on branchial regions (the outer row very indistinct in adult); antero-lateral margin crenulate, 4 teeth (anteriorly) on lateral expansion, and 3 on postero-lateral margin, the latter beaded, hind margin beaded, bounded by a tooth on each side, and with a feeble median one (not developed in juv.). Eye-stalk granulate. Sub-orbital border with 3 teeth (only 2 distinct in juv.), the area behind it smooth and concave. Lateral ridge bordering exhalant branchial canal slightly angular in front; median septum excavate in front, as if cut away, only the posterior thickened margin showing when the

1st maxillipeds are closed. Basal joint of ant. 2 produced as a scalloped process adjacent to suborbital ridge. Pterygostomial region densely setose. Lower outer border of wrist with 4 rounded lobes, in adult the penultimate lobe with a sharp denticle in middle, in both juv. and adult the ultimate lobe with a sharp subapical point. Lower border of hand of larger cheliped with 2 rows of granules, a strong but rounded granulate ridge between base of hand and molariform tubercle at base of thumb, between this ridge and the lower border the surface smooth and distinctly concave; a sharp tooth at base on lower outer surface. Upper part of outer surface of hands much more feebly tuberculate than in other species.

Length ♂ 40 mm., breadth 58 mm. Juvenile specimen examined 13 mm. in length.

Localities.—Natal coast, 20–36 fathoms (S. Afr. Mus.).

Distribution.—Indo-Pacific to Japan, Queensland, and New South Wales.

Remarks.—The above description is taken solely from the two South African specimens. The shape of the endostomial septum corresponds with Alcock's description, and the young specimens mentioned by Ihle. From his comparison with adults referred to this species, Ihle thinks the shape of the septum may alter with age; but the agreement between the young and the adult South African specimens does not confirm this suggestion.

The marked groove on the lower outer surface of the hands of both chelipeds is not mentioned by Alcock.

Calappa japonica Ortm.

Fig. 66, *n–p*.

1892. Ortmann, Zool. Jahrb. Abt. Syst., vi, p. 566, pl. 26, fig. 8.

1894. Alcock and Anderson, J. Asiat. Soc. Bengal, lxiii, p. 177 (*exanthematosa*).

1895. *Id.*, Illustr. Zool. R.I.M.S. "Investigator," Crust., pl. 15, figs. 1, 1, *a* (*exanthematosa*).

1896. Alcock, *l. c.*, p. 146 (*exanthematosa*).

1899. *Id.*, Deep-Sea Brachyura, "Investigator," p. 21 (*exanthematosa*).

1914. Parisi, Atti Soc. ital. Milano, liii, p. 287, fig. 1 (mxp. 1) and pl. xi.

1918. Ihle, *l. c.*, pp. 301, 308 (in list of species).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*flammea*, non Herbst).

1947. *Id.*, Ann. Mag. Nat. Hist. (xi), 13, p. 372.

Resembling *lophos* in general, but slightly broader, the anterior part of carapace with more numerous pustules and blunt tubercles, postero-lateral margin with larger teeth, no median tooth on hind margin, all 4 lobes on lower outer margin of wrist dentiform, lower border of hand of cheliped granulate all over, no ridge running to the molariform tubercle on thumb causing a groove between it and the lower border; the endostomial septum is not visible when 1st mxp. are closed, both the septum and ridges bordering exhalant canals square-cut and end at same level anteriorly; basal joint of ant. 2 not so strongly produced; teeth on suborbital area arranged slightly differently (*cf.* fig. 66, *k* and *o*).

Length ♀ 87 mm., breadth 125 mm. (Parisi: ♂ 97 × 147 mm., ♀ 76 × 107 mm.). As preserved, pale with salmon-pink mottling around the pustules and on hinder half of carapace.

Localities.—Trawling ground between Bushman River and Bird Island, Algoa Bay (trawler *Linnet*, 1905, 1 ♀) (S. Afr. Mus.); Portuguese East Africa (25° 45′ S., 33° 3′ E.), 58 metres (Barnard).

Distribution.—Japan, Bay of Bengal, 166–205 metres.

Remarks.—The single very fine ♀ specimen, compared above with *lophos*, is certainly referable to *japonica*. It is the only record from South African waters, except the Portuguese East African specimen, which I erroneously identified as *flammea*.

Gen. Mursia Desm.

1910. Stebbing, *l. c.*, p. 334.

1918. Ihle, Siboga Exp. monogr., xxxix, *b* 2, pp. 179, 300, 307 (list of species.)

1937. Rathbun, *l. c.*, p. 215 (credited to Leach. Leach's *Murcia* = *Cycloës*).

Carapace transversely oval or subcircular, without lateral wing-like expansions, but with a strong spine in middle of lateral margin. Orbits rather large, oval, lower margin with a deep notch; inner angle open, but filled by the slender, unexpanded basal joint of ant. 2. Mxp. 3 as in *Calappa*. Chelipeds subequal, wrist with 1–3 spines on lower outer margin, finger and thumb of the slightly larger cheliped with knob at base (but not enormously enlarged as in *Calappa*). Abdomen ♂ with 3rd–5th segments fused. Pleopod 2 ♂ longer than pleopod 1.

Stridulating mechanism present (in South African species) on inner surface of finger of cheliped and 3rd joint of mxp. 3.

Key to the South African Species.

1. Inner suborbital tooth oblong, apically truncate (slightly obliquely) (fig. 67, *f*). Hind margin of carapace even, slightly convex or nearly straight . . . . *cristimanus.*
2. Inner suborbital tooth triangular, apically acute (fig. 67, *g*). Hind margin of carapace bluntly trilobed . . . *armata.*

Mursia cristimanus de Haan.

Fig. 67, *a–f.*

1894. Ortmann, Semon's Austral. Reise, v, p. 35 (*cristata*).
1910. Stebbing, *l. c.*, p. 334.
1914. *Id.*, Trans. Roy. Soc. Edin., 50, pp. 272, 307.
1923. Odhner, Medd. Göteb. Mus., xxxi, p. 26.

Carapace slightly broader than long, granulate and tuberculate. Front triangular, apex acute, a more or less distinct denticle on each lateral margin. Antero-lateral margin crenulate. Hind margin even, slightly convex or nearly straight. Inner suborbital tooth oblong, slightly obliquely truncate (fig. 67, *f*). Wrist of cheliped with 3 spines on outer margin, the distal one the largest; outer surface of hand with a few conical or spiniform tubercles, and 3 spines near lower margin; lower margin dentate, upper margin with 7–8 sharp, cristate teeth. Stridulating mechanism (♂♀) formed by a series of short, transverse ridges on inner surface of finger (both chelipeds), and a transverse row of granules along distal margin of 3rd joint of mxp. 3. Basal segment of abdomen (♂♀) trilobed.

Length up to 30 mm., breadth 32 mm. (38 if lateral spines included). One extra large ♂ from Algoa Bay: 36 × 41 mm. (46 incl. spines). Smallest specimen examined 5 × 5·5 mm. Reddish brown with purple-red warts (Studer); pinkish or salmon with the branchial and cardiac tubercles deeper in colour or bright red, patches of the same colour on wrist, and on crest of the hand (K. H. B.).

Localities.—Table Bay (Studer, Miers, Doflein); south of Saldanha Bay and Dassen Island (Stebbing); False Bay (Miers, Stebbing, Doflein); Agulhas Bank (Miers, Doflein, Odhner); Port Elizabeth (Ortmann); East London (Stebbing); off Saldanha Bay, around Cape Peninsula, False Bay and Agulhas Bank to Cape Natal (Durban), 9–180 fathoms (S. Afr. Mus.).

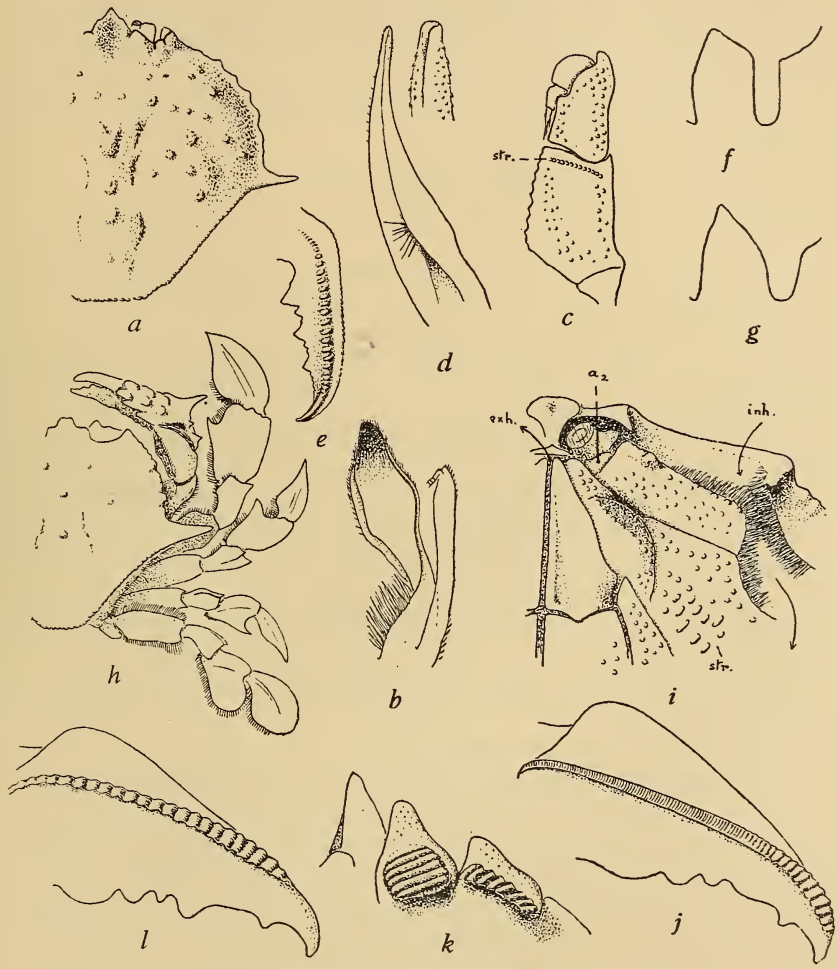


Fig. 67.—*Mursia cristimanus* de Haan. *a*, carapace. *b*, endopod and exopod (flagellum of latter cut short) of mxp. 1, calcified apex darkened. *c*, mxp. 3, exopod omitted. *d*, pleopod 1 ♂, with apex further enlarged. *e*, inner view of finger of cheliped with stridulating ridge. *f*, suborbital notch and inner suborbital tooth.

Mursia armata de Haan. *g*, suborbital notch and inner suborbital tooth.

Matuta banksii Leach. *h*, carapace with chelipeds and legs. *i*, ventral view of front and pterygostomial region, fur surrounding the stridulating tubercles omitted (*str.*), eye and ant. 1 removed, arrows indicating inhalant and exhalant (*inh.*, *exh.*) currents. *j*, outer view of finger of cheliped ♂. *k*, inner upper margin of hand of cheliped (♂♀) showing stridulating areas.

Matuta lunaris (Forsk.). *l*. outer view of finger of cheliped ♂.

Remarks.—One of the commonest crabs on the Agulhas Bank, but becoming rare, according to the numbers of specimens collected by the s.s. *Pieter Faure* in different localities, towards East London and Natal. Off the coast of Portuguese East Africa its place is taken by the following species.

Females are smaller, and apparently much less common than males.

Mursia armata de Haan

Fig. 67, *g*.

1894. Alcock and Anderson, J. Asiat. Soc. Bengal, lxiii, p. 179 (*bicristimana*).

1896. Alcock, *ibid.*, lxv, p. 150 (*bicristimana*).

1896. *Id.*, Illustr. Zool. R.I.M.S. "Investigator," Crust., pl. 24, fig. 5 (*bicristimana*).

1899. Alcock, Deep-sea Brachyura, p. 23, pl. 3, figs. 3, 3, *a*, *b* (*bicristimana*).

1904. Doflein, D. Tiefsee Exp., vi, pp. 39 *sqq.*, pl. 17, and pl. 18, figs. 2–4 (discussion of subspecies).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, pt. 3, p. 888, fig. 41, and pl. 16, fig. 1 (*spinimanus*).

1911. *Id.*, Trans. Linn. Soc. Lond., xiv, p. 198, pl. 15, fig. 3 [not "5"] (*spinimanus*).

1914. Parisi, Atti Soc. ital. Milano, liii, p. 290, and var. *trispinosa*, pl. 12.

1918. Ihle, *l. c.*, pp. 179, 300, 307.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*bicristimana*).

Carapace proportionately broader, granulation stronger, more even and conspicuous, front less prominent, than in *cristimanus*; lateral spine longer and straighter; hind margin bluntly trilobed. Inner suborbital tooth triangular, apically acute (fig. 67, *g*). Lower margin of hand of cheliped with the teeth (scarcely spiniform) more widely spaced than in *cristimanus*, and knobs at base of finger and thumb (larger cheliped) better developed. Ornamentation on legs (described by Alcock, 1896) the same as in *cristimanus*. Stridulating mechanism as in *cristimanus*.

Length 20 mm., breadth 25 mm. (37 if lateral spines included). Alcock: 47 × 67, excl. spines. As preserved, pinkish, a bright red spot on inner surface of hand of both chelipeds at insertion of finger.

Locality.—Portuguese East Africa (26° 3′ S., 33° 4′ E.), 290 metres (Barnard).

Distribution.—Seychelles, Ceylon, Indo-Pacific to Japan.

Remarks.—Both ♂ and ♀ correspond with Rathbun's 1911 illustration of the Seychelles specimen as regards the more conspicuous tubercles. Doflein, Parisi, and Ihle agree that one widely distributed species, with several subspecies or varieties, should be recognized.

Gen. Matuta Fabr.

1906. Klunzinger, Verh. D. Zool. Ges., xvi, p. 230 (structural peculiarities).

1910. Stebbing, *l. c.*, p. 335.

1918. Ihle, *l. c.*, p. 308 (list of species).

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 50.

1933. Chopra, Rec. Ind. Mus., xxxv, p. 31.

Carapace flattish, subcircular, with a large spine on middle of lateral margin. Front trilobed, median lobe more prominent than the others. Orbits oval, with a deep notch in lower border near outer orbital angle leading to a channel on subhepatic region, and covered over by a thick mat of setae; a narrow gap at inner angle (fig. 67, *i*). Ant. 2 very small and inconspicuous (fig. 67, *i*). Mxp. 3 elongate, extending to anterior margin of, and completely closing, the buccal cavity (fig. 67, *i*); no endostomial septum separating the exhalant canals. Chelipeds equal. Legs natatorial and fossorial, 6th and 7th (dactyl) joints laminately flattened and expanded. Abdomen ♂ with 3rd–5th segments fused. Pleopod 2 ♂ longer than pleopod 1. Stridulating mechanism consisting of 2 obliquely striate areas, one linear (proximal) and one oval or subcircular (distal), on inner surface of upper margin of hand of cheliped (fig. 67, *k*), and a double series of transversely elongate tubercles (concealed in a thick mat of setae) on the pterygostomial region (fig. 67, *i*). The proximal linear striate area on the hand may be feebly developed or even obsolete.

Remarks.—Owing to considerable variation many synonyms have arisen; but the number of recognized species has now been commendably reduced. Balss has described one species from West Africa, the only exception to an otherwise exclusive Indo-Pacific distribution.

As the striate areas on the inside of the hand will engage also with the milled or ribbed ridge on the outside of the finger of the opposite cheliped in the ♂, it seems likely that this may be a subsidiary or additional stridulating mechanism.

Chopra (1935, *l. c.*, p. 32), and Chopra and Das (1937, *l. c.*, *infra*), quoting Balss, 1922, say that *M. planipes* Fabr. ranges as far west

as the "Cape of Good Hope." But *M. planipes* does not appear to occur in South Africa, and in any case "Cape of Good Hope" must be understood as "South Africa," or more strictly speaking, "Natal."

Key to the South African Species.

1. Upper margin of 5th joint of 4th (penultimate) leg with a single keel. Ridge on finger of cheliped of ♂ coarsely ribbed (fig. 67, *l*) . . . . . *lunaris.*
2. Upper margin of 5th joint of 4th leg bicarinate. Ridge on finger of cheliped of ♂ very finely milled proximally, ribbed only towards apex (fig. 67, *j*) . . . . *banksii.*

Matuta lunaris (Forsk.)

Fig. 67, *l.*

1775. Forskål, Descr. Anim., p. 91, no. 44.

1781. Fabricius, Spec. Insect. Append., p. 502 (*victor*).

1830. Rüppell, Beschreib, 24 Krabben, p. 7, pl. 1, fig. 3, pl. 6, fig. 3 (*lessueri*).

1838. McLeay, Annulosa S. Afr., p. 70 (*victor*).

1843. Krauss, Südafrik. Crust., pp. 16, 52 (*victor*).

1877. Miers, Trans. Linn. Soc. Lond. (2), i, p. 243, pl. 39, figs. 1–3 (*victrix*), and p. 244, pl. 39, fig. 4 (var. *crebripunctata*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 810 (*victor*).

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 160 (*victor*).

1910. Stebbing, *l. c.*, p. 335.

1918. Ihle, *l. c.*, p. 185 (references).

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 383, fig. 1, *a* (abd. ♂).

The 6 tubercles on the carapace are rather indistinct, especially the anterior 2. Antero-lateral margin crenulate, the hinder crenulations larger but blunt (not dentiform). Tubercle in middle of postero-lateral margin sometimes fairly distinct, usually obsolete. Ridge in middle of outer surface of hand of cheliped running *downwards* to the *middle* of the thumb, with one large spine, followed sometimes by a smaller one, thereafter becoming often indistinct. A distinct spiniform tooth at base of lower outer margin of hand where it touches the wrist. Outer surface of finger in adult ♂ with a longitudinal ridge which is transversely ribbed from base nearly to apex; in ♀ and juv. ♂ smooth, though in adult ♀ there may be a few indistinct beads or

granules. Upper margin of 5th joint of 4th leg (penultimate) with a single keel.

Length up to 50 mm., breadth (excl. spines) 55 mm. Greyish or biscuit-colour, with numerous tiny red dots.

Localities.—Durban Bay and Umlaas River mouth (Krauss, and S. Afr. Mus.); Ibo and Mozambique (Hilgendorf); Chinde and Mozambique (coll. K. H. B.); Delagoa Bay (coll. van der Horst, and Lourenzo Marques Mus.).

Distribution.—Red Sea, Zanzibar, Madagascar, Indo-Pacific.

Matuta banksii Leach

Fig. 67, *h–k*.

1817. Leach, Zool. Miscell., iii, p. 14.

1865. Hess, Arch. Naturg., xxxi, pp. 158, 172, pl. 6, fig. 13 (*picta*)

1877. Miers, *l. c.*, p. 245, pl. 40, figs. 1, 2, and p. 246, pl. 40, figs. 5–7 (*picta*).

1896. Alcock, *l. c.*, p. 158 (references).

1918. Ihle, *l. c.*, p. 185 (references).

All 6 tubercles on carapace nearly always distinct. Antero-lateral margin crenulate anteriorly, with 2 or 3 larger, dentiform projections behind. Postero-lateral margin with a sharply defined (usually) denticle in middle. Ridge in middle of outer surface of hand of cheliped subparallel with lower margin and running to the gap between finger and thumb, with 5 teeth, the 1st small (or obsolete), the 2nd (and sometimes the 4th) large and sharp; near the lower border a less distinct and more or less knobbly ridge running on to thumb. Only a small but sharp tubercle at base of lower margin of hand. Finger in adult ♂ with a ridge which is minutely (not visible to naked eye) transversely striate or milled, striae gradually increasing in size until in the distal third they form distinct ribs; in ♀ and juv. ♂ smooth. Upper margin of 5th joint of 4th leg bicarinate.

Length up to 43 mm., breadth (excl. spines) 44 mm. Biscuit-coloured, with red dots forming rings, loops and vermiculations.

Localities.—Durban (S. Afr. Mus.); Delagoa Bay (coll. van der Horst); Mozambique (K. H. B.).

Distribution.—Mauritius (de Man, and S. Afr. Mus.); Red Sea, east coast of Africa, Indo-Pacific.

Remarks.—There is no difficulty in distinguishing adult ♂♂ of this species from *lunaris*, apart from the character of the 4th leg which is found in both sexes.

Family LEUCOSIIDAE.

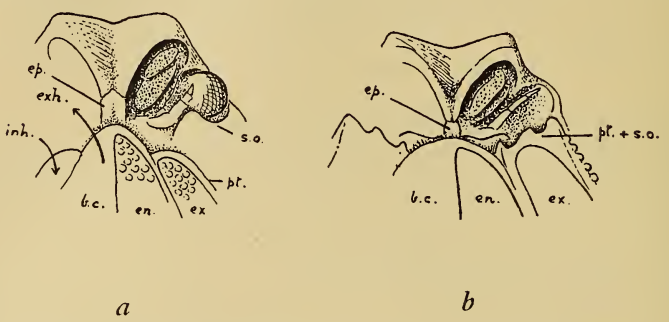
1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 478.

1910. Stebbing, *l. c.*, p. 335.

1918. Ihle, Siboga Exp. monogr., xxxix, *b*, 2, pp. 186–293, 297–305, 308–317.

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 121.

Carapace of usual crab-like shape, usually subcircular, oval, or polygonal, compact-looking. Orbits and eyes very small. Inhalant



a *b*

Fig. 68.—Ventral view of front and buccal cavity of *a*, *Ebalia*, and *b*, *Myra* (eye removed).

b.c., buccal cavity. *en.*, *ex.*, endopod and exopod of mxp. 3. *ep.*, epistome (so-called). *exh.*, *inh.*, exhalant and inhalant branchial channels. *pt.*, pterygostomial ridge. *s.o.*, suborbital border.

branchial channels opening at bases of external maxillipeds (mxp. 3), which are elongate and completely cover the buccal cavity. Gills less than 9. Male openings sternal. Pleopod 2 ♂ short (in South African genera examined).

Remarks.—As comparatively few of the known genera occur in South Africa, and as the proposed subfamilies are not sharply or satisfactorily defined, the following key takes no account of subfamilies.

Key to the South African Genera.

I. Anterior edge of pterygostomial groove (inhalant channel) well separated from suborbital border (fig. 68, *a*). Exopod of mxp. 3 distinctly shorter than endopod, anterior margin of buccal cavity (exhalant channels) in advance of inhalant channels (fig. 68, *a*).

A. Abdominal segments in both sexes distinct and movable . . . . . *Actaeomorpha.*

B. Some of the abdominal segments in both sexes fused.
1. Carapace subcircular or polygonal, convex, nodose, tuberculose, granulose. Eyes visible dorsally.
a. Front broad . . . . . *Heteronucia*.
b. Front narrow . . . . *Ebalia*, incl. *Lithadia*.
2. Carapace flattened, with raised beaded margin. Eyes not visible dorsally . . . . *Leucisca*.

II. Anterior edge of pterygostomial groove close to or coalescent with, and forming the suborbital border (fig. 68, *b*). Exopod of mxp. 3 not, or not much, shorter than endopod, anterior margins of buccal cavity (exhalant channels) and pterygostomial grooves (inhalant channels) more or less in a transverse line (fig. 68, *b*).
A. No lateral cavity.
1. Exopod of mxp. 3 narrower than 4th joint of endopod (fig. 68, *b*).
a. 4th joint of endopod of mxp. 3 a little less than half length of 3rd joint (measured along inner margin). No lateral projection . . . . . *Myra*.
b. 4th joint of endopod of mxp. 3 distinctly less than half length of 3rd joint. A strong lateral spiniform projection . *Arcania*.
2. Exopod of mxp. 3 broader than 4th joint of endopod (fig. 72, *d*, *l*) . . . . *Philyra*.
B. A cavity or sinus under the eave of lateral epibranchial angle, above base of cheliped (fig. 71, *j*) . . *Leucosia*.

Gen. Actaeomorpha Miers

1918. Ihle, *l. c.*, pp. 208, 301, 308.
1920. Stebbing, Ann. Durban Mus., ii, p. 272.

Carapace convex, pitted and granulate. Front rather broad. Eyes not prominent. Chelipeds stout, finger and thumb shorter, or at most not longer, than hand, apically acute, the thumb very broad at base, finger opening in a nearly vertical plane. Abdominal segments in both sexes all distinct and movable.

Actaeomorpha erosa Miers

Fig. 69, *a*, *b*.

1877. Miers, J. Linn. Soc. Lond., xiii, p. 184, pl. 14.
1911. Chilton, Trans. New Zealand Inst., xliii [1910], p. 555.
1915. Bouvier, Bull. Sci. Fr. Belg. (7), xlviii, p. 47, pl. 6, figs. 2, 3.
1918. Ihle, *l. c.* p. 308 (references and distribution).

1920. Stebbing, *l. c.*, p. 273, pl. 32.

1938. Balss, Medd. Göteb. Mus., lxxv, p. 8.

Carapace octagonal, lumpy, with deep pits in the hollows and around the postero-lateral and hind margins. Lower surface of 4th joint, and outer surfaces of wrist and hand of cheliped pitted and granulate, the granules on the latter two joints mostly in longitudinal rows. Upper margin of 4th joint of legs with one keel, of 5th joint with three, and of 6th joint with 2 keels. Abdominal segments corrugated and pitted.

Length 7 mm., breadth 9 mm.

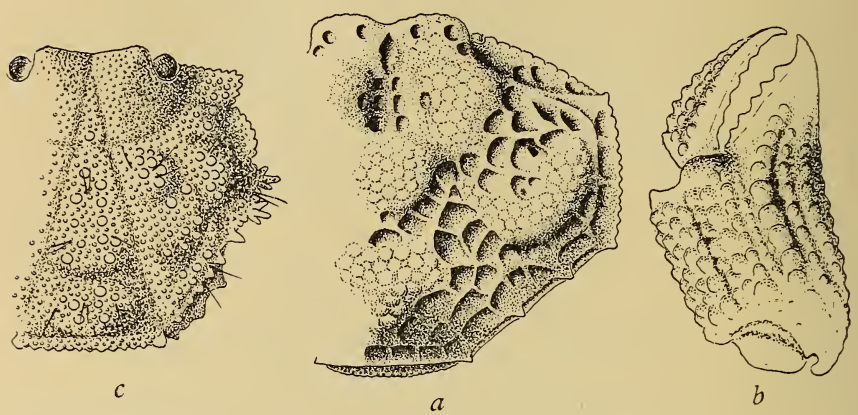


Fig. 69.—*Actaeomorpha erosa* Miers. *a*, carapace ♀. *b*, outer view of chela. *Heteronucia angulata* Brnrd. *c*, carapace ♀.

Locality.—Port Shepstone, Natal, 24 fathoms, 1 ♀ (Stebbing).

Distribution.—Mauritius; Kermadec Islands; Port Curtis, Australia; West Australia; Gilbert Is., Hawaiian Is.

Remarks.—The specimen described by Stebbing is in the South African Museum, but I have seen no other specimens.

Gen. Heteronucia Alck.

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 177.

1918. Ihle, *l. c.*, pp. 219, 301, 309.

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 385.

1941. Ward, Amer. Mus. Novit., no. 1104, p. 3.

Carapace convex, broader than long, granulate and tuberculate, or spinose. Front rather broad, shallowly bilobed. Eyes prominent. Chelipeds stout, finger as long as or a little longer than hand, opening

nearly vertically, thumb stouter than finger. Abdominal segments 3–5 in both sexes fused.

Remarks.—The following species, from its general likeness to the Ceylonese *H. vesiculosa*, is placed in this genus.

Heteronucia angulata Brnrd.

Fig. 69, *c*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 372.

Carapace with Λ-shaped groove from front to hind margin, branchial region somewhat lumpy, the whole closely covered with vesicular granules of more or less uniform size, a few larger ones on the branchial humps, cardiac and intestinal areas, and a few scattered bristles. Front broad, shallowly bilobed, notched at its junction with the epistome ventrally. Hepatic region forming an angular projection, with its anterior border horizontal in line with orbit, followed by a rounded lobe. Lateral angle formed by a trifid spinous projection, followed by a similar one and several bluntly spiniform or digitiform tubercles on postero-lateral margin. A dentiform projection on either side of buccal cavity, at tip of external maxilliped. Pterygostomial ridge not prominent. Chelipeds and legs granulate; finger of cheliped subequal to upper margin of hand.

Length 4 mm., breadth 4·75 mm.

Locality.—Delagoa Bay (coll. van der Horst, 1 juv. ♀).

Remarks.—This specimen appears similar to *oeschi* Ward 1941 from the Philippine Islands, but the small size and poor quality of the photographic illustration of the latter permits no proper comparison.

Gen. Ebalia Leach

1817. Leach, Malac. Podophth. Brit., text of pl. 25, and Zool. Miscell., iii, p. 18.

1855. Bell, Trans. Linn. Soc. Lond., xxi, p. 303 (*Ebalia* and *Phlyxia*) and p. 305 (*Lithadia*).

1910. Stebbing, *l. c.*, p. 337.

1918. Ihle, *l. c.*, pp. 225, 302, 310.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 247 (*Lithadia*).

1921. *Id.*, *ibid.*, xviii, p. 459.

1928. Lebour, J. Mar. Biol. Assoc. Plym., n.s., xv, p. 110, figs. (larval stages).

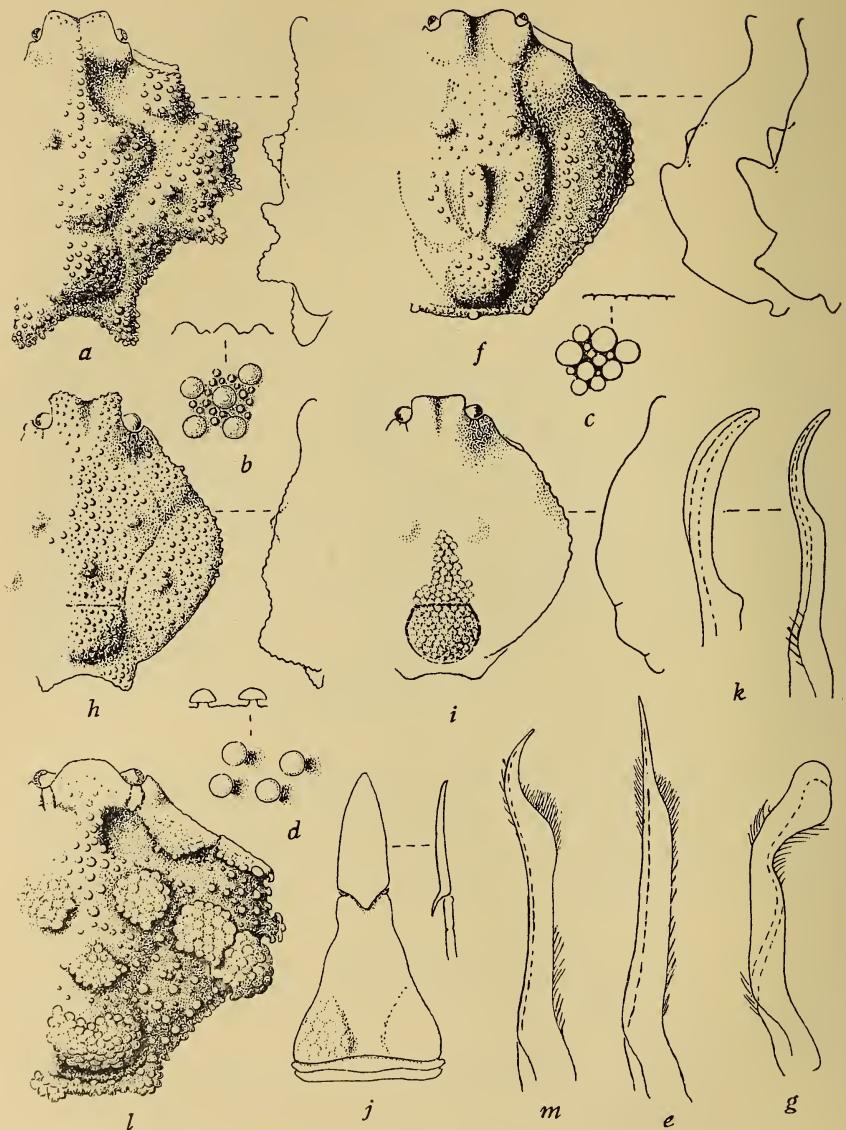


FIG. 70.—*Ebalia tuberculata* Miers. *a*, carapace ♂♀, with sagittal profile of dorsum. *b*, *c*, *d*, varieties of granulation (plan and elevation). *e*, 1st pleopod ♂.
Ebalia glomus Stebb. *f*, carapace ♀, with sagittal profile of ♀ (left) and ♂ (right). *g*, 1st pleopod ♂.
Ebalia tuberculosa f. *postulans* Stebb. *h*, carapace ♂, with sagittal profile.
Ebalia tuberculosa f. *scandens* Stebb. *i*, carapace ♀ (granular mosaic only partly indicated), with sagittal profile. *j*, abdomen ♂, with profile. *k*, 1st pleopod ♂, with apex further enlarged.
Ebalia (*Lithadia*) *barnardi* Stebb. *l*, carapace ♀. *m*, 1st pleopod ♂.

1932. Monod, Bull. Soc. Sci. Nat. Maroc., xii, pp. 206–210 (figs. of 5 Eur-afric. species).

1937. Rathbun, *l. c.*, p. 123, and p. 136 (*Lithadia*).

Carapace convex, tumid, nodose, granulate. Front rather narrow, subtruncate (*Ebalia*, *Lithadia*) or quadridentate (*Phlyxia*). Chelipeds moderate, sometimes elongate, finger and thumb subequal in length to hand, subequal to one another in width (thumb not greatly wider than finger). Abdomen with 3rd–5th (or 6th) segments in ♂, 3rd–6th in ♀, fused; usually a denticle at base of terminal segment in ♂.

Remarks.—Phlyxia, with quadridentate (incl. inner orbital angles) front, is included in *Ebalia* by Miers and Ihle. *Lithadia* differs from *Ebalia* only in the deeper or more extensive excavations on the dorsal surface of the carapace.

Key to the South African Species.

1. Tubercles on carapace more or less conical and evenly distributed. Upper margin of hand of cheliped rounded.
   - *a.* Carapace dorsally trilobed, a deep smooth furrow between the gastro-cardiac-intestinal and the branchial regions (fig. 70, *f*) . . . . *glomus.*
   - *b.* No deep smooth furrows.
     - i. Carapace suboctagonal, a laterally projecting tubercle on branchial region, pterygostomial ridge prominent, with one tubercle especially prominent . . . . . *tuberculata.*
     - ii. Carapace subhexagonal or subcircular, no laterally projecting tubercle on branchial region, pterygostomial ridge not prominent . . *tuberculosa.*
       - *α.* Carapace with mosaic of closely packed flat-topped granules (fig. 70, *i*) . . forma *scandens.*
       - *β.* Carapace with conical granules of various sizes and not closely packed . . forma *postulans.*

2. Tubercles to a large extent aggregated to form up-standing flat-topped bosses (fig. 70, *l*). Upper margin of hand of cheliped keeled . . . . . (*Lithadia*) *barnardi.*

Ebalia glomus Stebb.

Fig. 70, *f*, *g*.

? 1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 187, pl. 7, fig. 4 (*diadumena*).

? 1897. *Id.*, Illustr. Zool. R.I.M.S. "Investigator," Crust., pl. 29, fig. 4 (*diadumena*).

? 1906. Laurie in Herdman, Ceylon. Pearl Fish. Rep. 5, p. 360 (*diadumena*).

1921. Stebbing, *l. c.*, p. 460, pl. 17 (Crust., pl. 112) (*glomus*).

Carapace rhomboidal, length and breadth subequal, dorsally divided into a broad median (gastro-cardiac-intestinal) gibbosity and a branchial gibbosity on either side by a deep smooth furrow; the median gibbosity bears a pair of gastric tubercles, 3 longitudinal cardiac ridges, of which the median one is the more prominent and frequently overhangs anteriorly, and, separated by a shallow smooth groove, an intestinal hump. All the gibbosities are granulate, the rest of the surface, except the grooves, minutely granulate. Postero-lateral and hind margins beaded, the latter bounded by a larger granule or tubercle, with a median one; antero-lateral margin beaded as far as hepatic region; margin of latter, and of pterygostomial ridge minutely granulate. Front truncate, not beaded, extending as far as margin of buccal cavity, with deep dorsal groove. Hepatic and branchial regions separated by a shallow smooth (or with a few granules) groove. Cheliped 1½ times the length of carapace, arm (4th joint) shorter than length of carapace; arm, wrist, and hand granulate, the granules on outside of arm the largest; hand not much longer than wide, finger and thumb subequal to hand, with minutely beaded ridges. Legs smooth, with a few minute granules on 4th joint, dactyls long, slender, glabrous. Abdomen with 3rd–6th segments in ♂ fused, lateral margin indented at the suture (visible) between 5th and 6th segments (but these segments not movable), a rather large but low and blunt tubercle at end of 6th segment; 3rd–6th segments ♀ fused. Pleopod 1 ♂ apically enlarged, cowl-like, the groove beginning on inner side passes round on dorsal surface to the outer side.

Length and breadth up to 9 mm. ♀, ♂ smaller.

Localities.—Off Umhloti River and off Umvoti River (between Durban and Tugela River), 25–27 fathoms (Stebbing, and S. Afr. Mus.).

Distribution of E. diadumena.—Ceylon.

Remarks.—These specimens are so extraordinarily like *diadumena* that one can scarcely hesitate to refer them to the Ceylonese species. But until a direct comparison has been made, particularly as regards the 1st pleopod ♂, Stebbing's name may stand for the South African specimens. I have not seen Laurie's paper.

Ebalia tuberculata Miers

Fig. 70, *a–e.*

1881. Miers, Ann. Mag. Nat. Hist. (5), viii, p. 266, pl. 14, fig. 3.
1910. Stebbing, *l. c.*, p. 337 (? *tuberosa* var., non *tuberosa* Pennant).
1921. Balss, Beitr. Kenntn. Meeresf. Westafr., iii, p. 52.
1932. Monod, *l. c.*, p. 207, fig. 2.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 373.

Carapace octagonal, a trifle wider than long, nodose, covered with miliary granules, numerous but seldom in contact, sometimes prominent and even shortly stalked (mushroom-like), sometimes flattened (fig. 70, *b–d*), the intervening surface minutely granulate. Front subtruncate, with slight median notch, projecting beyond margin of buccal cavity. A marked hollow between the hepatic region and the rounded ridge on gastric region; a pair of cardiac tubercles, with a median one behind them; the latter separated by a shallow depression from the intestinal hump, which is more or less sharply conical; a pair of large conical tubercles on hind margin; a strong tubercle on the branchial region projecting postero-laterally. Pterygostomial ridge prominent, granulate, one granule or a granulate tubercle larger than the rest. Cheliped less than 1½ times length of carapace, arm less than length of carapace; arm, wrist, and hand closely granulate, some of the granules on outer margin of arm being conical, hand somewhat gibbous, not much longer than its width, upper margin rounded, finger and thumb subequal to length of hand, with minutely granulate ridges. Legs granulate, dactyls setose. Abdomen ♂ with 3rd–6th segments fused, a sharp point at base of terminal segment. Pleopod 1 ♂ slender, apically acute.

Length and breadth up to ♀ 11 mm., ♂ slightly smaller. Pinkish or reddish mottled with white, usually mostly red with the front, the median gastric ridge and the branchial and posterior tubercles white.

Localities.—Gt. Fish Point to Cape Natal (Durban), 47–85 fathoms (S. Afr. Mus.).

Distribution (*tuberculata*).—Senegal, Canaries, Azores, Morocco.

Remarks.—Stebbing had been given a wrong locality for "P.F. 10763," which is a s.s. *Pieter Faure* station off Cape Natal (not False Bay). He recorded this species with a query, as being in "near agreement" with Pennant's species. Bell's figure (1853, Brit. Stalk-eyed Crust., p. 141) of *tuberosa*, however, shows that the South African form is very different.

Monod's recent figure (*l. c.*, p. 206, fig. 1, *tuberosa*) confirms this, and on the other hand his fig. 2 shows that the South African specimens may well be the same as *tuberculata* Miers. Pending direct comparison of actual specimens, the South African form is recorded as *tuberculata*.

Odhner (1923, Medd. Göteb. Mus., xxxi, p. 16) records *tuberosa* (western Europe, Mediterranean, Canary Is., and West Africa (to 26° N.)) from Port Alexander, Angola.

Ebalia tuberculosa (M. Edw.)

Fig. 70, *h–k*.

1873. Milne Edwards, J. Mus. Godeffroy, iv, p. 86 (*Persephona t.*).

1879. Haswell, Proc. Linn. Soc. N.S.W., iv, p. 54, pl. 6, fig. 3 (*Phlyxia granulosa*).

1886. Miers, Rep. H.M.S. *Challenger*, xvii, p. 306, pl. 25, fig. 1 (♂).

? 1904. Doflein, D. Tiefsee Exp., vi, p. 47, pl. 16, figs. 1–3 (*salamensis*).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1930, p. 889.

1910. Stebbing, *l. c.*, p. 337.

1918. Ihle, *l. c.*, p. 311 (references only).

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 247, pl. 26, fig. A (Crust., pl. 106, fig. A) (*Nursia scandens*).

1921. *Id.*, *ibid.*, xviii, p. 461, pl. 18, fig. A (Crust., pl. 113, fig. A) (*Nursia postulans*).

1921. *Id.*, *ibid.*, p. 462, pl. 18, fig. B (Crust., pl. 113, fig. B) (*N. scandens*).

1923. Rathbun, Biol. Res. "Endeavour," v, p. 134, pl. 35, figs. 1, 2.

1927. Hale, S. Austral. Crust., pt. 1, p. 197, fig. 198.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 373.

Forma *postulans*. Carapace subhexagonal or subcircular, with 2 prominent posterior tubercles; 2 gastric tubercles, one cardiac and one on each branchial region; an elevated intestinal hump, the intestinal region fairly well defined by grooves; branchio-cardiac grooves moderately distinct; whole surface with numerous conical granules, interspersed with minute granules; some of the granules on the lateral branchial and hepatic margin and pterygostomial ridge almost pedunculate. Chelipeds and legs with a mosaic of flattened closely packed granules (as in *scandens*). Abdomen ♂ (*fide* Stebbing) without tubercle or projection. Pleopod 1 ♂ (according to Stebbing's figure) as in *scandens*.

Forma *scandens*. Carapace subhexagonal or subcircular, the 2 posterior tubercles more prominent in smaller (4·5 mm.) than larger specimens (7 mm.); 2 very slight convexities on gastric region, intestinal region clearly marked by impressed lines; pterygostomial ridge not prominent; surface covered with a reticulation or mosaic of flat-topped closely packed granules. Chelipeds and legs similarly sculptured. Abdomen ♂ with a pointed projection at base of terminal segment projecting backwards over the suture between 6th and 7th segments. Pleopod 1 ♂ distal third narrowly spoon-shaped and curved outwards.

Length and breadth up to 7 mm.

Localities.—*postulans*: off Cape Natal, Durban, 184 fathoms (Stebbing).

scandens: off Cove Rock, East London, 80–130 fathoms (Stebbing); off Gt. Fish Point, 100 fathoms (S. Afr. Mus.).

Distribution (*tuberculosa*).—Australia, New Zealand, Hawaiian Is.

Remarks.—Whitelegge (1900) and Rathbun (*l. c.*) have mentioned the variability in the granular covering of *tuberculosa*, ranging from flat-topped granules forming a pavement-like surface, to the separate conical granules forming a rough surface. At first sight *scandens* and *postulans* are two distinct species, and though there are no transitions in the small amount of material from South Africa, an exactly similar variation in granulation occurs in the *tuberculata* material, the extreme forms of which look totally different.

The specimen figured by Miers appears to have the flattened granular mosaic sculpture. Except for the length of the chelipeds, his figure fits the South African specimens of *scandens* very well.

E. tuberculosa differs from *tuberculata* in never having *laterally projecting* tubercles or bosses.

E. salamensis, from off Dar-es-Salaam, 400 metres, is closely allied and may prove identical. Although Doflein did not mention it, the photograph of the underside appears to indicate that there is a sharp projection at the base of the terminal segment abdominal. Pleopod 1 ♂ is not described.

Stebbing, while quoting Leach to the effect that the tubercle on the ♂ abdomen is on the last segment in *Ebalia* but on the 6th in *Nursia*, put his species in *Nursia* though in this respect it clearly agrees with *Ebalia*. Further, his description and figure of the mxp. 3 (4th joint less than half length of 3rd) is erroneous.

Ebalia (*Lithadia*) *barnardi* Stebb.

Fig. 70, *l*, *m*.

1920. Stebbing, *l. c.*, p. 248, pl. 21 (Crust., pl. 101).

Carapace octagonal, with sunken areas bearing isolated, more or less numerous, mushroom-like granules, and more or less strongly raised areas or bosses formed by the coalescence of such granules. Front truncate or bluntly rounded, without notch, more or less granulate, projecting beyond margin of buccal cavity. A raised area on hepatic region and anterior "shoulder" of branchial region; a deep hollow on either side of the anterior gastric region, which bears a pair of raised bosses; a raised boss on cardiac and on intestinal region, and an elongate (more or less divided into two) boss on branchial region; lateral corners of hind margin more or less prominent and boss-like. Pterygostomial ridge not prominent. The 2 supra-orbital fissures distinct. Chelipeds and legs as in *tuberculata*, but hand of cheliped with upper margin distinctly carinate and sinuous. Abdomen with 3rd–6th segments fused in both sexes, in ♂ a sharp tubercle at base of terminal segment. Pleopod 1 ♂ slender, apically rather abruptly narrowed to an acute apex, and curved outwards.

Length up to ♀ 9 mm., breadth 11 mm.; ♂ smaller.

Localities.—Off Umhloti River, Natal, and East London, 25–45 fathoms (Stebbing); off Port Shepstone, Natal, 24 fathoms, and Algoa Bay (S. Afr. Mus.).

Remarks.—No two specimens are exactly alike as regards the quantity of isolated granules on the sunken areas, or the prominence of the boss-like areas; in the largest ♀ the latter pass gradually into the sunken areas, without the sharp undercut boundaries seen in other specimens (*cf.* Bell, 1855, Trans. Linn. Soc. Lond., xxi, p. 305, variation in *Lithadia cummingi*).

In spite of Stebbing's statement (p. 249) all the specimens were obtained by the s.s. *Pieter Faure.*

Gen. Leucisca McLeay

1838. McLeay, Annulosa S. Afr., p. 70.

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 161 (*Carcinaspis*).

1907. *Id.* (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 161 (*Carcinaspis*).

1910. Stebbing, *l. c.*, p. 338 (*Leucisca* and *Carcinaspis*).

1918. Ihle, *l. c.*, pp. 207, 208 (statement of systematic position, no discussion, both genera accepted).

1920. Stebbing, Ann. Durban Mus., ii, p. 271.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 373.

Carapace subcircular, but narrowing abruptly to the truncate, laminately projecting front, depressed, almost flat, with more or less raised costate margin; regions not marked. Orbits below margin of carapace, a very faint groove (suture α or β of Ihle) showing on dorsal surface; completely separated from sockets of 1st antennae. Antenna 2 minute, basal joint indistinguishable. Pterygostomial ridge anteriorly well separated from suborbital border, notched. Apex of buccal cavity (exhalant canals) projecting well beyond the pterygostomial ridges (inhalant canals) to between the sockets of 1st antennae; no epistome (fig. 71). Chelipeds rather stout, subequal in the two sexes, hand and finger moving in a horizontal plane. Legs strong, 4th joint not completely concealed under lateral margin of carapace. Abdomen with 3rd–6th segments fused in both sexes, segments 1 and 2 extremely short and sunken in ♂, segment 1 in ♀ invisible.

Remarks.—Both being based on specimens from the same country, the identity of Stimpson's genus with McLeay's is so obvious that Stebbing's hesitancy (1920, p. 271) to unite them seems strange. Incidentally Stebbing (*l. c.*) credited McLeay with a figure of the pleon, but the figure in question really belongs to *Dehaanius*. McLeay has given an accurate figure of the anterior ventral surface.

Ihle (*l. c.*) placed both genera in the subfamily *Leucosiinae* (Miers, Alcock, Ihle). It seems, however, to be more allied to *Nursia* and the Ebaliids.

Endemic genus, with one species.

Leucisca squalina McLeay

Fig. 71, *a–c*.

1838. McLeay, *l. c.*, p. 70, pl. 3, figs. *a*, *b*.

1858. Stimpson, *l. c.*, p. 161 (*Carcinaspis marginatus*).

1907. *Id.*, *l. c.*, p. 162, pl. 14, fig. 7 (*C. marginatus*).

1910. Stebbing, *l. c.*, p. 338 (*L. squalina* and *C. marginatus*).

1920. *Id.*, *l. c.*, p. 272, pl. 31 (*phaenomma*).

1947. Barnard, *l. c.*, p. 373.

Carapace with central (gastric) portion slightly convex, two frontal

convexities and a cardiac-intestinal convexity may be indicated, margin more or less raised, with 2–3 series of minute granules; indication of (flattened) granules on the central portion. Anterior portion of pterygostomial region with relatively large flat-topped granules, closely packed but separated by deep crevices, sometimes these crevices enlarged or eroded (cf. *Ebalia* (*Lithadia*) *barnardi*). External maxillipeds (mxp. 3) more or less distinctly granulate. Cheliped, arm triquetral, the edges with (flattened) granules, wrist more or less granulate, hand inflated, outer (upper) and inner (lower) edges, and a ridge on middle of upper (outer) surface more or less granulate; finger and thumb shorter than hand, grooved, opposing margins denticulate. Legs with 4th joint dorsally unicarinate, 5th and more distinctly the 6th bicarinate. Abdomen in (adult) ♂ with a sharp tubercle near distal margin of 6th segment. Pleopod 1 ♂ rather stout, but abruptly narrowing to a long slender spiniform apex.

Length up to 9 mm., breadth 10·5 mm.; ♀ smaller. White or creamy, uniform or with reddish dots, or 2 red longitudinal stripes, or a broad median red band from hind margin to gastric or to frontal region; or uniform pinkish or salmon.

Localities.—Cape of Good Hope (McLeay, Stimpson); False Bay coast (Stebbing); littoral, under stones, in False Bay, Sebastian Bay, Port Shepstone (Natal) and Durban (S. Afr. Mus.); Jeffreys Bay (coll. T. A. Stephenson).

Remarks.—Natal specimens are smaller (both sexes) than Cape specimens, but otherwise indistinguishable.

Gen. Myra Leach

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 200.

1918. Ihle, *l. c.*, pp. 255, 303, 313.

Carapace ovoid or subglobular, with 3 spines on hind margin (the median one on a higher level than the lateral ones), smooth and granular (not nodose or eroded), regions scarcely if at all demarcated; hepatic region separated by a semicircular emargination from the branchial region. Front narrow, bidentate. Epistome very small. Anterior margin of pterygostomial groove tridentate, scarcely separated from suborbital margin (fig. 68, *b*). Chelipeds usually elongate and slender, finger and thumb slender, as long as or shorter than hand. Abdomen with segments 3–6 fused in both sexes. Juveniles often with 5 spines on hind margin.

Remarks.—Indo-Pacific. The closely allied genus *Persephona*

(Atlantic and West American coast) is distinguished by the anterior margin of the pterygostomial groove being bidentate.

The record of *Persephona punctata* (Linn.) (Miers, 1886, p. 312, footnote, and Stebbing, 1910, *l. c.*, p. 336) is not accepted, because Miers himself was not too sure of his identification. It is also possible that the specimen did not come from South Africa; Sir Andrew Smith also obtained specimens from other parts of the world.

Myra fugax (Fabr.)

Fig. 71, *d*, *e*.

1849. M. Edwards in Cuvier, Règne Anim. Crust., pl. 25, figs. 3 3, *a*.

1855. Bell, Trans. Linn. Soc. Lond., xxi, p. 297, pl. 32, fig. 3 (*carinata*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 811 (*fugax* and *punctata*), p. 812, pl. 1, figs. 6, 7 (*coalita* juv. ♂).

1896. Alcock, *l. c.*, p. 202 (references).

? 1910. Stebbing, *l. c.*, p. 336 (*Persephona cuphaeus* Linn.).

1918. Ihle, *l. c.*, p. 256 (references), figs. 104, 112 (orbital and pterygostomial regions).

1930. Monod, Zool. Anz., xcii, p. 140, fig. 8.

1931. Shen, Hong Kong Natural., ii, p. 108, pl. 10, fig. 2.

1933. Chopra, Rec. Ind. Mus., xxxv, p. 39, fig. 3 (mxp. 3).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 72, fig. 7, B, C (plp. 1, 2 ♂).

Carapace subcircular (excl. posterior projection), margins finely beaded, surface convex, smooth except for tracts of minute granules (scarcely visible to naked eye), hepatic region forming a distinct facet bounded by a line of granules. A slight medio-longitudinal keel posteriorly, more or less distinct. Posterior projections granulate. Chelipeds elongate, especially in adult ♂, arm granulate, finger about $\frac{2}{3}$ length of hand. A conical tubercle at distal end of the fused abdominal segments in ♂.

Length (excl. spine) up to 40 mm., breadth 36 mm. Pinkish, darker (maroon) on anterior portion of carapace.

Locality.—Delagoa Bay (coll. van der Horst).

Distribution.—Ibo, Portuguese East Africa; Zanzibar; Red Sea; Indo-Pacific. By migration through Suez Canal to Palestine coast and Gulf of Alexandrette, Syria.

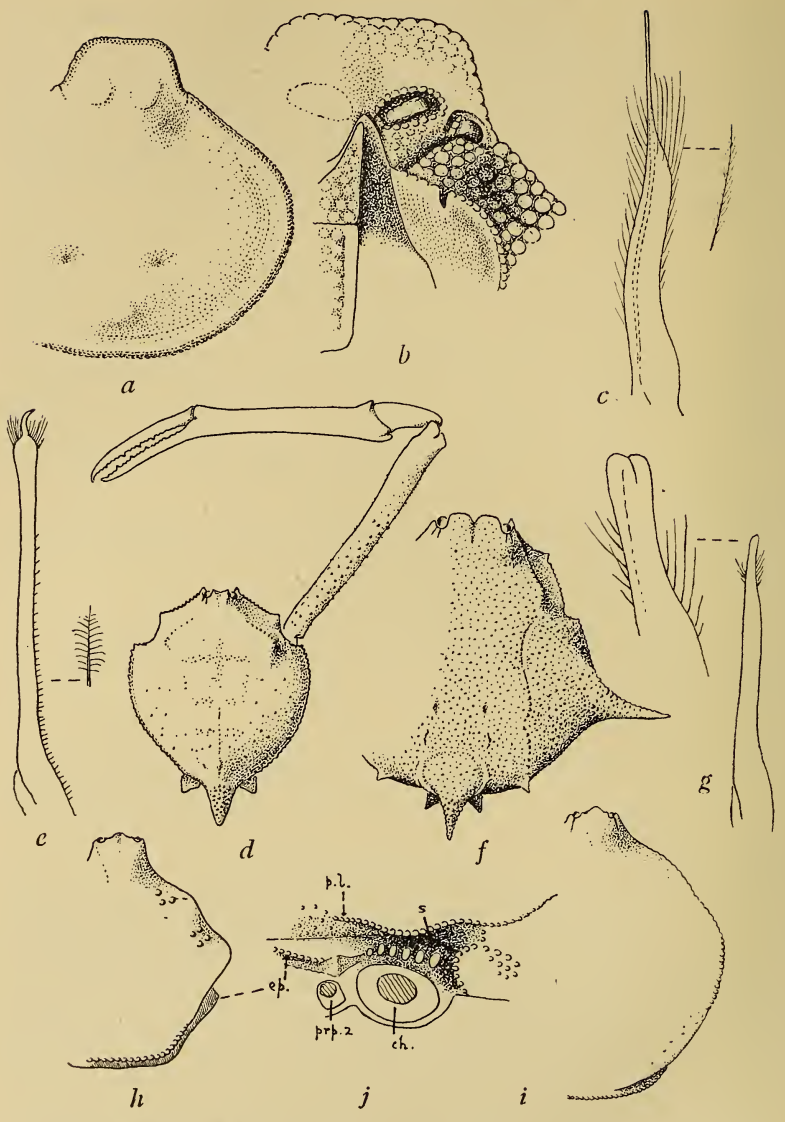


FIG. 71.—*Leucisca squalina* McLeay. *a*, carapace. *b*, ventral view of front, buccal cavity, pterygostomial region. *c*, pleopod 1 ♂.
Myra fugax (Fabr.). *d*, carapace, with cheliped. *e*, pleopod 1 ♂.
Arcania septemspinosa (Fabr.). *f*, carapace. *g*, pleopod 1 ♂, with apex further enlarged.
Leucosia whitei Bell. *h*, carapace, redrawn after Bell, semi-diagrammatic.
Leucosia marmorea Bell. *i*, carapace. *j*, lateral view of carapace, right side, showing sinus (*s*), true postero-lateral margin (*p.l.*), epimeral margin (*ep.*), cheliped and 2nd leg (*ch.*, *prp.* 2) cut off.

Remarks.—Ward (1942, Mauritius Inst. Bull., ii, p. 67, pl. 5, fig. 1) described *cyrenae* from Mauritius, distinguished by minor differences from *fugax*.

Gen. Arcania Leach

1910. Stebbing, *l. c.*, p. 337.

1918. Ihle, *l. c.*, pp. 262, 303, 313.

Carapace subcircular, oval, or rhomboidal, lateral and posterior margins with (usually) large spines, smooth, granulate, regions scarcely demarcated. Front bilobed. Epistome very small. Anterior margin of pterygostomial groove fused with and forming the suborbital border. Chelipeds slender, elongate, finger and thumb slender. Abdomen with segments 3–5 in ♂, 3–6 or 4–6 in ♀, fused. Mxp. 3 with 4th joint distinctly less than half length of 3rd.

Arcania septemspinosa (Fabr.)

Fig. 71, *f*, *g*.

1849. M. Edwards in Cuvier, Règne Anim. Crust., pl. 25, fig. 4 (after Herbst).

1910. Stebbing, *l. c.*, p. 337.

1918. Ihle, *l. c.*, p. 265.

1933. Chopra, Rec. Ind. Mus., xxxv, p. 43, fig. 5 (mxp. 3).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 73, fig. 7, F (plp. 1 ♂).

[Not *septemspinosa* Bell 1855.]

Carapace subcircular (or subrhomboidal), finely granulate, with 7 spines: a large straight lateral epibranchial spine, a shorter median posterior one on the intestinal region and projecting backwards, one small spine on postero-lateral margin, hind margin with a spine at each end (the latter 3 projections may be spiniform or sharply tubercular). Finger of cheliped longer than hand. Abdomen with segments 3–6 in ♂, 4–6 in ♀, fused.

Length and breadth (excl. spines) up to 14 mm. (Alcock: 20 mm.).

Localities.—Off Tugela River mouth, 12–14 fathoms (Stebbing); off Zululand coast, 26 fathoms (S. Afr. Mus.).

Distribution.—Red Sea, Indian Seas, East Indies to Hong Kong.

Remarks.—It is unfortunate that Stebbing was supplied with "the Cape" as the locality for the s.s. *Pieter Faure* specimens no. 11426; it has been quoted in the literature (Ihle, *l. c.*, pp. 266, 313; Chopra, *l. c.*; Stephensen, *l. c.*) and gives a wrong impression of the distribution of this warm-water species in South Africa.

Gen. Philyra Leach

1906. Laurie in Herdman, Ceylon Pearl Fish. Rep. v, pp. 363 *sqq.*
1910. Stebbing, *l. c.*, p. 336.
1918. Ihle, *l. c.*, pp. 273, 304, 314.
1932. Shen, Zool. Sinica, ix, p. 18.
1937. Rathbun, *l. c.*, p. 167.

Carapace circular, convex, but not strongly so, regions scarcely if at all defined; usually surrounded by a beaded margin, more prominent in juv. than adult, the antero-lateral portion continued uninterruptedly on to the pterygostomial ridge. Edges of pterygostomial ridges and apex of buccal cavity projecting beyond the rather broad front. Epistome very small. Margin of pterygostomial groove scarcely separated from suborbital border. Chelipeds usually elongate and slender, longer in ♂ than in ♀, hand more or less inflated and broader than arm, finger and thumb slender, hand lying horizontally and finger moving horizontally. Exopod of mxp. 3 broader than 4th joint of endopod, usually laminately expanded (to a variable extent). Abdomen with some of the segments in both sexes fused.

Remarks.—Indo-Pacific, with numerous closely allied species. The South African forms are easily separable into species, but, with the exception of *punctata*, the true identity of the species remains provisional pending comparison with authentically named specimens. Descriptions frequently leave out of consideration characters which appear to be essential to a correct identification, *e.g.* 1st pleopod ♂. Considerable variation in sculpturing may occur.

Near the inner margin of 3rd and 4th joints of mxp. 3 there is a submarginal fringe of setae, which is well marked in the ♀, but almost or quite obsolete in the ♂; only in *globulosa* does the groove (from which the setae arise) remain in the ♂, causing the margin to be distinctly costate. This seems to be rather a curious sexual difference.

Shen (*l. c.*) has given figures of the 1st pleopod ♂ in some species. The five South African species exhibit four types of structure. The more or less blunt chitinized tip, with a brush of setae, is found in *globulosa platychira*, *tuberculosa* (*fide* Shen), and Shen's two species; and may possibly be correlated with an oval, non-expanded exopod on mxp. 3.

Among the South African species there are three different types of ♂ abdomen. In *punctata* the 1st segment is well defined, though sunken, the 2nd very prominent; in *globosa* and *scabriuscula* both 1st and 2nd are sunken, but visible throughout their width; in *platychira*

and *globulosa* the 1st is distinct, but only the lateral extremities and a median oval piece of the 2nd are visible externally.

Key to the South African Species.

I. Mxp. 3 glabrous, exopod more or less widely expanded distally (fig. 72, *d*, *g*). Eye-stalk short, stout.
  A. Arm of cheliped definitely triquetral (fig. 72, *b*). 2nd abdominal segment ♂ very prominent, transversely keeled (fig. 72, *c*) . . . . . *punctata.*
  B. Arm of cheliped nearly cylindrical. 1st and 2nd abdominal segments ♂ inconspicuous, sunken.
    1. Opposing margins of finger and thumb of cheliped denticulate (*cf.* fig. 72, *b*).
      a. Pterygostomial ridge and apex of buccal cavity not very prominent. Carapace without granules visible to the naked eye . . . . . *globosa.*
      b. Pterygostomial ridge and apex of buccal cavity projecting prominently beyond the front. Carapace with branchio-cardiac-intestinal grooves, and visible granules . . . . . *scabriuscula.*
    2. Inner margin of thumb with fringe of short, stiff setae; inner margin of finger sharply trenchant, quite smooth (fig. 72, *j*). Hepatic facet completely circumscribed by beaded margins . . . . . *platychira.*
II. Mxp. 3 furry, exopod oval, not distally expanded (fig. 72, *l*). Eye-stalk longer and more slender. Thumb of ♂ cheliped with large tooth fitting into a basal excision on finger (fig. 72, *k*) . . . . . *globulosa.*

Philyra punctata Bell

Fig. 72, *a–e*.

1910. Stebbing, *l. c.*, p. 336.

[Not Barnard, 1926. = *scabriuscula.*]

Carapace smooth to the naked eye, but with numerous pits; the intervening surface in ♀ is shagreened or minutely and closely granulate but in ♂ nearly always more distinctly closely and regularly granulate, so much so that the pits are obscured, some of the granules near the middle line often slightly larger; juveniles often very distinctly granulate. The beaded margin usually more distinctly beaded in ♂ than in ♀, but always more distinct and serrulate in juv. (fig. 72, *a*,

left). Hepatic facet incomplete, *i.e.* dorsal margin marked by a few granules (serrulations in juv.) which, however, do not meet the antero-lateral margin. Front straight, with median depression down to epistome. Pterygostomial ridge with 5 or 6 (extremes 4–7) prominent, squarish lobules or teeth, the innermost one the most distinct (often with subsidiary denticles on inner margin), the outermost with a distinct gap between it and the continuation of the beaded (or serrulate) margin; the innermost teeth of the two sides project well beyond the apex of the buccal cavity, forming in dorsal view a sub-quadrangular excision in the profile. Anterior margin of pterygostomial ridge not setose, though the concave channel below is setose; most of the straining of the inhalant current is done by the fringe of short setae on the margin of the widely expanded exopod of mxp. 3; inner margin of 3rd joint of latter not costate in ♂, but with submarginal fringe in ♀. Cheliped with arm triquetral in cross-section, upper margin ridged, anterior (inner) surface flattened, opposing margins of finger and thumb trenchant, evenly denticulate, but feebly so and often only distally in ♀; whole cheliped granulate, especially the upper outer and lower inner margins of arm (serrulate in juv.), lower surface of hand shagreened only, in ♀ almost smooth. Abdomen in ♂ with segments 1 and 2 distinct for whole width, the 2nd transversely carinate and strongly granulate, segments 3–5 fused, more or less strongly granulate basally, segment 6 slightly wider proximally than distal width of 5th, and distinctly narrower distally, without tubercle; in ♀ segment 1 invisible, 3–6 fused, but suture between 3 and 4 distinct. Pleopod 1 ♂ slender, tapering to an acute, in-turned apex. A few minute short setules scattered over anterior part of carapace (best seen when specimen is removed from liquid and drained, not wiped, as each setule retains a drop of moisture).

Length and breadth up to ♂ 21 mm., ♀ 16 mm.; pterygostomial projection not included in length, which is usually a trifle greater than breadth; cheliped ♂ 42 mm. Smallest ovigerous ♀ 10 mm., smallest specimen examined 5 mm. Pinkish or salmon, usually (especially in juv.) a paler or white lozenge-shaped or cuneiform patch on gastric region, sometimes extending back on to cardiac and intestinal regions.

Localities.—Simon's Bay, 4–7 fathoms (Bell); Mossel Bay (Stebbing); Plettenberg Bay, St. Francis Bay, and Algoa Bay, shallow water (Doflein); False Bay and Agulhas Bank to Algoa Bay and off Gt. Fish Point, 5–30 fathoms (S. Afr. Mus.); Table Bay and Saldanha Bay, 22–24 fathoms (S. Afr. Mus.).

Remarks.—Doflein gives photographs because Bell's figure was "not

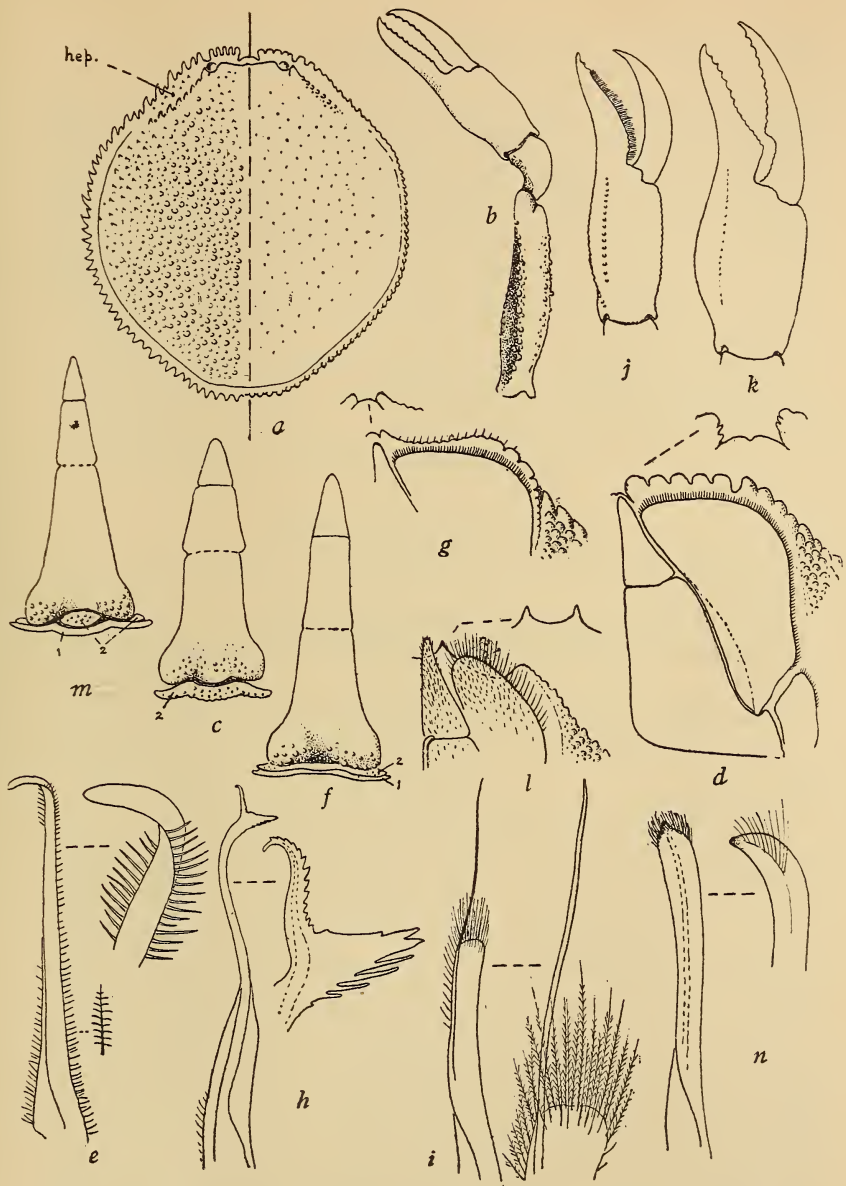


Fig. 72.—*Philyra punctata* Bell. *a*, carapace, juv. (left) and adult (right), *hep.*, hepatic facet. *b*, cheliped. *c*, abdomen ♂, 1st segment not shown. *d*, pterygostomial ridge and mxp. 3 (ventral view), with apex of buccal cavity further enlarged (dorsal view). *e*, pleopod 1 ♂, with apex further enlarged.

Philyra globosa (Fabr.). *f*, abdomen ♂. *g*, pterygostomial ridge and mxp. 3, with apex of buccal cavity further enlarged. *h*, pleopod 1 ♂, with apex further enlarged.

Philyra scabriuscula (Fabr.). *i*, pleopod 1 ♂, with apex further enlarged.

Philyra platychira de Haan. *j*, chela.

Philyra globulosa M. Edw. *k*, chela. *l*, pterygostomial ridge and mxp. 3, with apex of buccal cavity further enlarged. *m*, abdomen ♂. *n*, pleopod 1 ♂, with apex (in lateral view) further enlarged.

very good"; the ♂ abdomen is well shown, but otherwise Bell's figures are infinitely more useful in practice than the photographs!

This species is common on sandy areas on the Agulhas Bank. Its place is taken farther east (Natal) by *globulosa* and the other Indo-Pacific species. It is easily distinguished at a glance by the triquetral arm of the cheliped. A strongly granulate juvenile, with its serrulate margin, looks a very different species from the adult, especially an adult ♀.

Other species with triquetral arms are *sexangula* Alck. 1896, *alcocki* Kemp 1915, and *olivacea* Rathbun 1910.

Philyra globosa (Fabr.)

Fig. 72, *f–h.*

1798. Fabricius, Sp. Insect., i, p. 497, and Ent. Syst., ii, p. 441 (♀, apud de Man).

1888. de Man, J. Linn. Soc. Lond., xxii, p. 202.

1893. Henderson, Trans. Linn. Soc. Lond., v, p. 401, pl. 38, figs. 1–3 (*polita*).

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 243.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 83, fig. 12 (plp. 1 ♂, etc.).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 373.

Carapace to the naked eye smooth, but pitted and finely shagreened, minutely granulate more or less extensively on the branchial and cardiac-intestinal regions. Circumference with a very slight indent in the hepatic region, with a beaded border of nearly equal-sized granules. Branchio-cardiac grooves scarcely visible; no hepatic facet. Pterygostomial ridge laterally beaded, but from below the eye medianly finely crenulate, sparsely fringed with short setae, its inner angle moderately prominent; apex of buccal cavity forming a rather narrow excision in dorsal view, semicircular or U-shaped in front view. Mxp. 3 glabrous except for inner submarginal line of setae in ♀ on 3rd and 4th joints, exopod widely expanded. Cheliped with arm subcylindrical, its upper margin rounded, visibly granulate proximally, the granules petering out distally except along upper, outer, and lower borders; rest of cheliped minutely granulate, opposing margins of finger and thumb evenly denticulate. Abdomen ♂ with segments 1 and 2 very short, more or less sunken, segments 3–6 fused (but suture between 5 and 6 distinct), proximally granulate and laterally gibbous with median hollow, segment 6 nearly parallel-sided, about twice as

long as wide, without tubercle; in ♀ segment 1 invisible, 3–6 fused (suture between 3 and 4 distinct). Pleopod 1 ♂ elongate, distally slender, apically widely bifurcate, the inner branch serrate and curling inwards at tip, outer branch triangular, laminate, with deep narrow incisions on outer margin. Short scattered setules on carapace anteriorly.

Length up to ♂ 22, ♀ 18 mm., breadth ♂ 21, ♀ 17 mm.

Locality.—Off Tugela River mouth, 12 fathoms (S. Afr. Mus.).

Distribution.—Coasts of India, and Mergui Archipelago.

Remarks.—Four ♂♂, 1 ovig. ♀ and 1 juv. ♀ were taken together with a large number of *globulosa*. Strict identity with the Indian form can only be proved by examination of the 1st pleopod ♂.

Philyra scabriuscula (Fabr.)

Fig. 72, *i*.

1798. Fabricius, Ent. Syst. Suppl., p. 349.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 132, pl. 20, figs. 9, 10 (not good).

1877. Targione-Tozzetti, Zool. Magenta. Crost., p. 196, pl. 12, fig. 1.

1896. Alcock, *l. c.*, p. 239 (references).

1918. Ihle, *l. c.*, p. 275 (references), figs. 97, 102, 115 (frontal regions, sternum).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*punctata*, non Bell).

1937. Chopra and Das, Rec. Ind. Mus., xxxix, p. 388.

1937. Menon, Bull. Madras Mus., III, 5, p. 43, figs. (development).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 88, fig. 15, C–E (chela, plp. 1 ♂).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 374.

Carapace pitted, and with granules, visible to naked eye, extending more or less over the branchial, cardiac-intestinal, and gastric regions; branchio-cardiac grooves distinct; a slight ridge with 2–3 granules bordering the hepatic facet dorsally, but not connecting with antero-lateral margin. Circumference closely beaded, anteriorly the beading passes on to the pterygostomial ridges without notch or interruption below the eye; innermost points of pterygostomial ridge blunt, forming with the apex of buccal cavity a narrow U-shaped incision; in dorsal view these ridges and the buccal cavity project well beyond the front (Alcock: "like lower jaw of a bull-dog"). Mxp. 3 glabrous

except for submarginal line of setae in ♀ on 3rd and 4th joints, exopod widely expanded. Cheliped with arm subcylindrical, visibly granulate, but granules mostly petering out distally, inner margin of wrist with a row of granules (feeble in ♀), opposing margins of finger and thumb denticulate. Abdomen ♂ with segments 1 and 2 very short, more or less sunken, 3–6 fused (suture between 5 and 6 distinct), segment 6 without tubercle; in ♀ segment 1 invisible, 3–6 fused, suture between 3 and 4 distinct. Pleopod 1 ♂ rather short and stout, with apical brush of plumose setae, and a long exceedingly slender filamentous (but stiff) process. Short scattered setules on carapace anteriorly.

Length 9 mm. (10, incl. "lower jaw of bull-dog"), breadth 10 mm. Greyish, paler below.

Locality.—Chinde, mouth of Zambesi River, Portuguese East Africa in sand between tide-marks, 1 ♂, 1 ♀ (Barnard).

Distribution.—Red Sea, Zanzibar, Indian coasts, Mergui, Nicobars, East Indies.

Remarks.—The 1926 record (as *punctata*) was due to my accepting, without criticism, Stebbing's identification of the specimens.

Philyra platychira de Haan

Fig. 72, *j*.

1841. de Haan, Fauna Jap. Crust., p. 132, pl. 33, fig. 6.

1874. Milne Edwards, Nouv. Arch. Mus. Paris, x, p. 43, pl. 2, fig. 4 (*longimana*).

1894. Ortmann, Semon's Austral. Reise, v, p. 36 (*platycheira*).

1896. Alcock, *l. c.*, p. 242.

1906. Laurie, *l. c.*, p. 363.

1915. Balss, Denkschr. K. Ak. Wiss. Wien, xcii, p. 15.

1918. Ihle, *l. c.*, p. 315 (in list of species).

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 368, fig. 1, and pl. 60, figs. 5, 6 (*platycheira*).

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 89, figs. 15, F–K, 16 (chart) (*variegata*, discussion of synonymy).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 374.

Carapace to the naked eye smooth or even polished, but pitted and shagreened, and posteriorly minutely granulate. Branchio-cardiac grooves distinct. Hepatic facet distinct and complete, its upper beaded margin joining the beaded circumference. Pterygostomial ridge with notch below eye, medianly to which it is much less distinctly beaded or crenulate; the blunt inner angles forming with the

apex of buccal cavity a narrow U-shaped excision. Mxp. 3 glabrous except for the submarginal fringe in ♀, exopod distally expanded, but not so strongly as in preceding species. Cheliped with arm subcylindrical, but somewhat triquetral distally, granulate, a line of granules on inner margins of wrist and hand, more distinct in ♂ than ♀, inner margin of thumb entire, except for 2 subapical denticles, densely fringed with setae, finger curved, ensiform, inner margin thin, trenchant, entire. Abdomen ♂ with segment 1 short, sunken, 2 invisible externally except at lateral extremities and medianly as an oval piece interpolated between segments 1 and 3 (and usually fused to the latter), 3–6 fused but suture between 5 and 6 distinct, 6 without subapical tubercle but with distal margin raised medianly as a flat transverse tubercle; in ♀ segment 1 invisible, 3–6 fused, but suture between 3 and 4 distinct. Pleopod 1 ♂ fairly stout, with apical chitinized tip, and brush of setae (similar to that of *globulosa*). A few scattered setules on carapace anteriorly.

Length and breadth up to ♂ 15 mm., ♀ 12 mm.

Localities.—Off Amatikulu River mouth, Zululand, 13 fathoms, fine sand, 2 ♂♂, 4 ♀♀ (S. Afr. Mus.); Delagoa Bay (coll. van der Horst).

Distribution.—Red Sea, east coast of Africa, Indo-Pacific to Japan and Australia.

Remarks.—Easily distinguished by the peculiar finger and thumb of cheliped.

Philyra globulosa M. Edw.

Fig. 72, *k–n*.

1782. Herbst, Krabben, I, ii, p. 90, pl. 2, fig. 19 (*anatum*).

1798. Fabricius, Ent. Syst. Suppl., p. 349 (*Leucosia globulosa*, *fide* M. Edw.) (♂, apud Alcock).

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 132.

1849. *Id.* in Cuvier, Règne Anim. Crust., pl. 24, figs. 4, 4, *a*, *b*.

1896. Alcock, *l. c.*, p. 245.

1918. Ihle, *l. c.*, p. 273.

1933. Chopra, Rec. Ind. Mus., xxxv, p. 38.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 77, figs. 10, 11, A–L.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 374.

Carapace to the naked eye smooth, but pitted and shagreened, minutely granular in ♀ and juv. (chiefly on branchial regions), some-

times in juv. some larger granules in medio-dorsal line. Branchiocardiac grooves broad and shallow. Hepatic facet not indicated, except by a few granules in juv. Circumference minutely beaded, some of the beads at more or less regular intervals larger, and in the juv. forming denticles. Pterygostomial ridge as far as below eye minutely beaded, thence concave and entire to the sharp projecting inner tooth, which with the apex of the buccal cavity forms a broad shallow excision. Mxp. 3 furry, inner margin of 3rd joint distinctly costate in ♂ as well as in ♀, exopod oval, not expanded, its outer margin thickly setose. Cheliped with arm subcylindrical, with visible granules (usually), a line of fine granules on inner margin of wrist and hand, less distinct in ♀ than in ♂, inner margins of finger and thumb denticulate, in *adult* ♂ thumb with a large tooth basally fitting into an excavation on base of finger. Abdomen ♂ with segment 1 distinct but very short and sunken, segment 2 visible only at lateral extremities and as a median oval piece, 3–6 fused (suture between 5 and 6 distinct), 6 with tubercle in its distal half in *adult* ♂; in ♀ segment 1 invisible, segments 3–6 fused, suture between 3 and 4 distinct. Pleopod 1 ♂ fairly stout, with apical chitinized tip and brush of setae. Eye-stalks distinctly longer and more slender than in the other South African species. Anterior part of carapace and the front furry.

Length and breadth up to ♂ 16, ♀ 13 mm. (Alcock: ♂ 30, ♀ 24 mm.).

Localities.—Off East London (4 specimens), and coast of Natal and Zululand (a large number of ♂♂, ♀♀, and juv.), 12–54 fathoms (S. Afr. Mus.).

Distribution.—Persian Gulf, Indian Seas to East Indies and Siam.

Remarks.—According to the s.s. *Pieter Faure* log-book, this species seems to prefer muddy ground, to which, no doubt, its furry "front" and longer eye-stalks are adaptations. These features and the oval exopod of mxp. 3 (both sexes) render this species easily identifiable.

Specific name: de Man (1888, p. 203) says that "in its other characters the male [*i.e.* Fabricius' type ♂] perfectly agrees with the female" [Fabricius' type ♀]. It (the ♂) should therefore have an *expanded* exopod of mxp. 3, because de Man says his Mergui specimens have an expanded exopod, and "they perfectly agree with Fabricius' female type." On the other hand, on p. 204 he says the 6th abdominal segment of Fabricius' type ♂ has a tubercle, which the Mergui specimens have not got. This certainly points to Fabricius' ♂ being the species which Alcock has called *globulosa* M. Edw.; but was de Man quite accurate regarding the exopod of Fabricius' ♂?

de Man has in effect designated Fabricius' ♀ as the type of *globosa*

(Fabr.), the Mergui specimens being plesiotypes. Alcock (p. 245) has designated Fabricius' ♂ as the type of *globulosa* M. Edw.

M. Edwards (1837) in his synonymy of *globulosa* quotes Fabricius' (Ent. Syst. Suppl., p. 349) "*Leucosia globulosa.*" Did Fabricius actually write "*globulosa*"? If so, and if his ♂ type ("*globosa*") has an unexpanded exopod of mxp. 3, should not *globulosa* be credited to Fabricius and not to Milne Edwards?

If "*globulosa* Fabr." cannot be maintained, can Herbst's *anatum* be proved to be the same species, thus taking priority and avoiding the use of two confusingly similar names? Stephensen (*l. c.*, pp. 78, 82) says that *anatum* cannot be recognized with certainty.

Gen. Leucosia Fabr.

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 209.
1918. Ihle, *l. c.*, pp. 276, 305, 315.
1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 249.
1927. Gurney, Trans. Zool. Soc. Lond., pt. 2, p. 284 (larva).
1933. Chopra, Rec. Ind. Mus., xxxv, pp. 32–38.
[Not *Leucosia* Rathbun, 1937, p. 194.]

Carapace very convex, almost hemispherical, subcircular to hexagonal in outline, smooth (hepatic region sometimes defined), glazed or polished, frontal region narrowed and up-turned (snout-like); lateral epibranchial angle bent downwards towards base of cheliped forming the eave of a sinuous Y-shaped cavity: the thoracic sinus (Ihle, *l. c.*, p. 192, fig. 107) (fig. 71, *j*). The true postero-lateral margin ill-defined behind the lateral angle, its place taken by the epibranchial margin which is thickened and milled, and continuous with a beaded crest forming the hind margin. Pterygostomial ridge fused with and forming the suborbital margin. Epistome very small. Chelipeds rather stout, hand and finger moving in a horizontal plane. Legs small. Abdomen in both sexes with some of the segments fused.

Remarks.—The hemispherical shape and the "snout" are a ready means of distinguishing this genus.

Key to the South African Species.

In both species outer margin of hand not carinate.

1. Postero-lateral border thickly furry. Epimeral edge visible in dorsal view (fig. 71, *h*). 4th joint of legs (walking) compressed . . . . . *whitei.*
2. Postero-lateral border not furry. Epimeral edge not visible in dorsal view except a small portion posteriorly (fig. 71, *i*). 4th joint of legs subcylindrical . . *marmorea.*

Leucosia whitei Bell.

Fig. 71, *h*.

1918. Ihle, *l. c.*, p. 283, fig. 101 (orbit).

1920. Stebbing, *l. c.*, p. 249.

Carapace about as long as broad, hexagonal, a narrow strip of short thick fur on postero-lateral border, 3–4 granules on an angular hump on hepatic region, and a group of granules just in front of lateral epibranchial angle, antero-lateral margin smooth as far as front end of thoracic sinus, true postero-lateral margin beaded as far as level of 3rd (*i.e.* 2nd walking) leg; epimeral edge visible throughout in dorsal view, inflexed surface below hind margin punctate and granulate. Arm of cheliped closely nodular except on middle of ventral surface, hand inflated, its inner edge sharply granulate. 4th joint of legs compressed, granulate on edges, 5th and 6th joints sharply carinate dorsally.

Length 10 mm., breadth 9 mm. (Stebbing) (Alcock: 14 × 13·5 mm.).

Locality.—Natal coast, 27 fathoms (Stebbing).

Distribution.—Andaman Is., East Indies to Eastern Australia.

Remarks.—The specimen was not returned by Stebbing; the above description is taken from Alcock.

Leucosia marmorea Bell

Fig. 71, *i*, *j*.

1855. Bell, Trans. Linn. Soc. Lond., xxi, p. 286, pl. 30, fig. 4.

1896. Alcock, *l. c.*, p. 221.

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 439, pl. 22, fig. 3.

1918. Ihle, *l. c.*, p. 316 (in list of species).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

Carapace longer than broad by the length of the "snout," subcircular, smooth and polished, sparsely pitted laterally, antero-lateral margin crenulate, becoming beaded at lateral epibranchial angle, true postero-lateral margin beaded as far as level of 2nd (1st walking) leg, epimeral edge not visible in dorsal view except a small portion posteriorly, beaded posterior margin nearly straight, surface below it quite smooth. Thoracic sinus defined below by the granulate hind margin of pterygostomial region and 5–6 large granules at base of cheliped (fig. 71, *j*). Arm of cheliped nodose, except the dorsal and

ventral surfaces distally, wrist and hand with a row of granules on inner margin. 4th joint of legs subcylindrical, finely granulate on upper and lower margins, 6th joint carinate on upper margin. Abdomen ♂ with strong tubercle on 6th segment (adult). Pleopod 1 ♂ straight, tapering to a plain subacute apex, but specimen not fully adult (no tubercle on 6th abdominal segment).

Length 29 mm., breadth 25 mm. (Bell: 35 × 30 mm.).

Locality.—Portuguese East Africa (26° 17′ S., 33° 10′ E.), 415 metres (Barnard). (See Addenda.)

Distribution.—Maldives, Andamans, Philippine Is., Singapore.

Remarks.—Hilgendorf (1878, MB. Ak. Wiss. Berlin, p. 811) quotes Bianconi's record (1869, Spec. Zool. Mossambic, fasc. xix/xx, p, 341) of *L. urania* Herbst from Mozambique. *L. longifrons* de Haan, *neocaledonica* M. Edw., *pulcherrima* Miers, and *ornata* Miers are all very closely allied to *urania*, and may prove to be merely varieties of it, as Alcock and Ihle considered *neocaledonica* and *pulcherrima* to be. Alcock separates *marmorea* on account of the carapace being *longer than broad by the length of the snout*; *longifrons* having the length and breadth approximately equal. But the figures of *urania* (Milne Edwards in Cuvier, 1849), and *pulcherrima* and *ornata* (Miers, 1877) all agree with Alcock's diagnosis of *marmorea*.

Family DORIPPIDAE.

1910. Stebbing, *l. c.*, p. 339.

1916. Ihle, Siboga Exp. monogr., xxxix, *b*, 1, pp. 97–158.

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, p. 75.

Carapace usually flat, subquadrangular or subcircular, short, leaving the first two or three abdominal segments uncovered dorsally. First two pairs of (walking) legs long and strong; last two pairs short and slender, dorsal in position and ending in hook-like dactyls. Gills less than 9. Male genital openings coxal, female openings sternal or coxal; when the latter are coxal a pair of sternal grooves is present (Ihle, *l. c.*, fig. 49; cf. *Dromiidae*). Openings of inhalant branchial channels variable.

Key to the South African Genera.

I. Mxp. 3 not covering anterior part of buccal cavity, floor of exhalant canals formed by the calcified endopods of mxp. 1. Openings of inhalant canals in front of chelipeds. Female genital openings sternal (sternal groove absent). Eggs small and numerous (*Dorippinae* or *Sternitrema*).

A. A narrow bridge of the carapace between cheliped and inhalant branchial opening . . . . *Dorippe.*
B. Inhalant openings immediately in front of cheliped . [*Ethusa*].

II. Mxp. 3 almost completely closing in the buccal cavity and forming floor of exhalant canals. Openings of inhalant canals reduced or absent. Female genital openings coxal, sternal grooves present. Eggs large and few (*Cyclodorippinae* or *Peditrema*).
A. Carapace subquadrangular. Inhalant openings reduced. Exopod of mxp. 3 with flagellum, epipod reduced (*Cymonomae*) . . . . . *Cymonomus.*
B. Carapace oval or subcircular. Inhalant openings absent. Exopod of mxp. 3 without flagellum, epipod absent (*Cyclodorippae*).*
1. Carapace broader than long. Interocular distance much less than half width of carapace *Corycodus.*
2. Carapace about as broad as long. Interocular distance at least half width of carapace . *Xeinostoma.*

Gen. Dorippe Fabr.

1899. Milne Edwards and Bouvier, Res. Sci. Camp. Monaco, fasc. xiii, p. 16.
1910. Stebbing, *l. c.*, p. 339.
1916. Ihle, *l. c.*, pp. 148, 153, 156.

Carapace subquadrangular, broader behind than across frontal margin, which is formed by the bilobed front, the recedent supra-orbital margin, and a strong tooth at outer orbital angle, being the continuation of the lateral margin; regions well defined. Apex of buccal cavity (exhalant openings) produced upwards between the 1st antennae to meet the front. Exopod of mxp. 3 without flagellum. An inner subocular tooth, usually well developed. Openings of inhalant canals a little distance in front of bases of chelipeds, protected by a fringe of long setae around margin. Chelipeds in ♂ usually unequal. Abdomen of 7 distinct segments in both sexes. Pleopod 2 ♂ short.

Key to the South African Species.

1. Carapace broader than long. Inner subocular tooth smooth *lanata.*
2. Carapace longer than broad, slightly. Inner subocular tooth stout, serrate . . . . . *dorsipes.*

* In the South African genera a wide gap between bases of chelipeds and next pair of legs.

Dorippe lanata (Linn.)

Fig. 73, *d*.

1900. Milne Edwards and Bouvier, Exp. Travailleur, Talisman, Crust., p. 33.

1904. Doflein, D. Tiefsee Exp. vi, p. 32.

1910. Stebbing, *l. c.*, p. 339.

1921. Balss, Beitr. Kennt. Meeresf. Westafr., iii, p. 49.

1933. Monod, Bull. Com. Sci. Afr. occid. Fr., xv, pp. 35–39, figs. 3, C–G, 4, C, D, 5, A, B, D (comparison with *armata*) (pagination of separate copy).

Body and legs, except finger and thumb of cheliped and dactyls of legs, pilose-setose. Apex of exhalant canals meeting front and visible in dorsal view. Supra-ocular lobe distinct from frontal lobe.

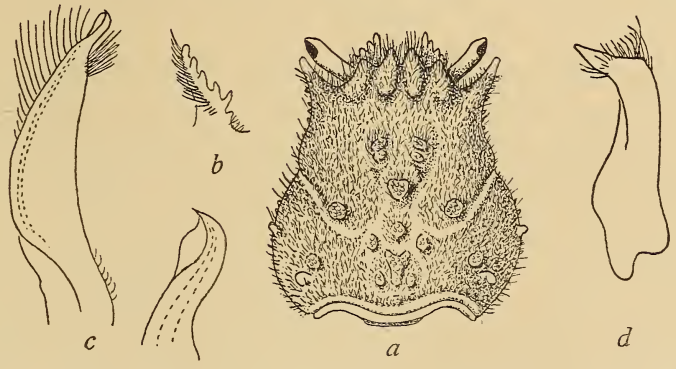


Fig. 73.—*Dorippe dorsipes* (Linn.). *a*, carapace. *b*, ventral view of left subocular tooth. *c*, pleopod 1 ♂, with apex further enlarged. *Dorippe lanata* (Linn.). *d*, pleopod 1 ♂.

Carapace broader than long, with bands and patches of granules or small tubercles, variable in extent, the most constant being 2 oval (submedian) gastric patches, and an intestinal Y- or V-shaped band. Inner subocular tooth spiniform and smooth. Coxa of 4th leg adjoining the 1st abdominal segment, narrow, at least anteriorly (as in Monod's fig. 5, B, D). Right cheliped ♂ not noticeably larger than left. 4th joint of 2nd and 3rd legs spinulose on upper margin, 5th joint also but more feebly so.

Length up to 18 mm., breadth 23 mm. (Pesta, 1918: 30 × 40 mm.).

Localities.—Off Umhloti River mouth (Natal), 46 metres (Stebbing); off Gt. Fish Point and off Tugela River mouth, 30–46 fathoms (S. Afr. Mus.).

Distribution.—Mediterranean, Ivory Coast, Congo River mouth.

Remarks.—Monod has compared this and the closely allied species *armata* Miers. One point, not mentioned, but which shows clearly in Monod's figs. 4, C, and 5, A, is the distinctness of the supra-ocular lobe in *lanata* (in *armata*, fig. 4, A, it forms an even margin with the lateral margin of the frontal lobe).

Dorippe dorsipes (Linn.)

Fig. 73, *a–c.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 812 (*quadridentata*).

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 277 (references).

1903. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 439, pl. 22, fig. 1.

1916. Ihle, *l. c.*, pp. 148, 153, 156, figs. 41, 45, 51, 54, 58, 59, 61, 63, C.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*lanata* laps. cal.).

1931. Shen, Hong Kong Natural., ii, p. 98, text-figs. 5–7, pl. 5, figs. 1, 2.

1945. Stephensen, Dan. Sci. Invest. Iran, pt. 4, p. 63, fig. 4, A, B (plp. 1, 2 ♂).

Pilose-setose. Carapace longer than broad, with raised nodules, mostly granular; the hinder outer nodule on branchial region, the lateral branchial spine and apex of antero-lateral spine non-granulate and bare. Inner subocular tooth very large and prominent, serrate on upper border. Supra-ocular lobe distinct from frontal lobe. Lateral margin serrate behind antero-lateral tooth. Cheliped with smooth white conical granules on outer surface of arm, wrist, and hand; in ♂ one of the hands usually enlarged. Outer margin of 5th joint of 2nd and 3rd legs granulate. Abdomen ♂ with low median boss on 1st segment, 3 knobs on both 2nd and 3rd, one subgranular median one on 4th, and a small rather sharp tubercle on 5th segment; in ♀ 3rd–5th segments each with a transverse denticulate ridge, the median tooth on 3rd and 4th segments enlarged.

Length up to ♀ 32 mm., breadth 31 mm. (Alcock: ♂ 36 × 34 mm., ♀ 25 × 24 mm.).

Localities.—Portuguese East Africa (27° 17′ S., 33° 10′ E.), 415 metres (Barnard); Delagoa Bay (coll. van der Horst).

Distribution.—Ibo and east coast of Africa, Indo-Pacific to China, Japan, Queensland, and West Australia.

Remarks.—The record of this species from Portuguese East Africa as "*lanata*" was due to a *laps. cal.*, as the original MS. notes contain the correct name.

Gen. Cymonomus M. Edw.

1905. Alcock, Ann. Mag. Nat. Hist. (7), xv, p. 566.
1916. Ihle, *l. c.*, pp. 118, 152, 153.
1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 244.
1937. Rathbun, *l. c.*, 96.

Carapace subquadrangular, post-gastric, cardiac and branchial regions fairly well defined. Front rostriform, more or less prominent. Supra-orbital border either distinct with the eye-stalks inserted below level of rostrum, and either separate or fused basally; or rostrum and eye-stalks forming a trifid front, without any supra-orbital margin, or groove or suture separating the eye-stalks from carapace. Cornea much reduced and unpigmented, or obsolete. Antenna 1 large, unconcealed. Antenna 2 not concealed, peduncle with prominent renal tubercle. Mxp. 3 almost completely covering buccal cavity, palp exposed, exopod with flagellum. No apparent inhalant openings. Chelipeds equal. 2nd and 3rd legs very long, especially the dactyl of 3rd; 4th and 5th legs with claw-like dactyls. Abdomen with segments distinct. Female genital openings on 3rd coxae. Pleopod 2 ♂ as long as or slightly longer than pleopod 1. Eggs large, few. Development abbreviated, without free-swimming stage.

Remarks.—Deep water, Atlantic and Indian Oceans. There seems to be an unusual disinclination on the part of most authors who have dealt with this genus to regard the forms from various parts of the world as full species. There would seem to be, however, quite a lot of difference between a form with separate, more or less movable eye-stalks, and one where the eye-stalks are fused together or with the rostrum. A comparison of the 1st pleopods ♂ has apparently not been made. On the basis of the following division, there seems no reason why Stebbing's species should not be maintained with full specific rank.

Key to the Species and Subspecies.

I. A distinct supra-orbital margin.
  A. Distance between outer bases of eye-stalks about half anterior width of carapace. Eye-stalks separate, movable . . . . . } *granulatus typicus.*

B. Distance between outer bases of eye-stalks about one-quarter anterior width of carapace.

1. Eye-stalks separate, immovable . . . { *andamanicus.* / *granulatus* / *indicus.*

2. Eye-stalks fused together basally below the rostrum . . . . . { *normani.* / *granulatus valdiviae.* / *granulatus* n. subsp. Hansen.

II. No supra-orbital margin. Eye-stalks fused on either side of rostrum, distance between their outer bases one-half width of carapace . . . . . *trifurcus.*

Cymonomus trifurcus Stebb.

Fig. 74, *a–f.*

1920. Stebbing, *l. c.*, p. 245, pl. 20 (Crust., pl. 100).

The trifurcate front, composed of the fused eye-stalks and rostrum, passes into the carapace without any suture or supra-orbital margin; width of front at base of eye-stalks half width of carapace. Carapace glabrous except for a short fringe along hind margin, densely granulate, the granules sessile posteriorly, pedunculate anteriorly, with a few especially elongate ones on antero-lateral angle; in juv. sparsely granulate posteriorly, more thickly anteriorly where the granules, especially those on antero-lateral angles, are conical or spiniform. Rostrum triangular, in adult with stalked granules, in juv. with spiniform denticles; medio-ventrally carinate. Eye-stalks with stalked granules in adult, spiniform denticles or conical granules in juv. Area between base of rostrum and eye-stalks, bases of antennae, and buccal cavity smooth and polished. Chelipeds granulate, less strongly so on inner surfaces, inner upper margin of wrist and hand with some longer spiniform denticles. Legs granulate, dactyls of 4th and 5th legs short, strongly arcuate with 3 spines on inner margin. Pleopod 1 ♂ forming a simply folded sheath for the slightly longer 2nd pleopod, which has apically a groove leading to the acute apex (cf. *Corycodus*).

Length 7 mm., breadth 6 mm.; total length of "body" (carapace plus the projecting doubled-up abdomen) of ovig. ♀ 9·5 mm.

Localities.—Off East London, 300 fathoms, and off Cape St. Blaize, 125 fathoms (Stebbing); off Umhlangakulu River mouth (Natal, near Port Shepstone), 50 fathoms, 2 juv. ♂♂ (S. Afr. Mus.); off Cove Rock, East London, 43 fathoms (S. Afr. Mus.).

Gen. Corycodus M. Edw.

1880. Milne Edwards, Bull. Mus. Comp. Zool. Harv., viii, p. 23.
1910. Stebbing, *l. c.*, p. 340 (*Nasinatalis*).
1916. Ihle, *l. c.*, pp. 124, 152, 154.
1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 242.
1937. Rathbun, *l. c.*, p. 101.

Carapace broader than long, semicircularly arched anteriorly, postero-lateral margins converging, hind margin concave. Front bilobed, with decurrent groove, meeting apex of buccal cavity. Mxp. 3 completely covering buccal cavity, palp small and concealed under 4th joint, exopod without flagellum. Chelipeds equal, finger and thumb slender, elongate. 2nd leg inserted considerably behind base of cheliped. Abdomen in ♂ with segments 4–7 fused, in ♀ segments 5 and 6 fused. Pleopod 1 ♂ a simple sheath for the slightly longer pleopod 2. Eggs large, few; development presumably abbreviated, without free-swimming stage.

Remarks.—Besides the Indian Ocean species, one other species in the West Indies. No male of either species has, apparently, hitherto been described.

Corycodus disjunctipes (Stebb.)

Fig. 74, *g–i.*

1910. Stebbing, *l. c.*, p. 340, pl. 16 (Crust., pl. 42) (*Nasinatalis d.*).
1916. Ihle, *l. c.*, Zool. Anz., xlvi, p. 362 (*bouvieri*).
1916. *Id.*, *l. c.*, p. 124, figs. 44, 68.
1920. Stebbing, *l. c.*, p. 242.

Carapace sparsely setose; dorsally and on pterygostomial regions, sternum and abdomen closely granulate, the granules on carapace anteriorly more prominent, more or less stalked, the antero-lateral margin with spiniform denticles, which are continued in a curved line from lateral epibranchial angle inwards across the branchial region (to a variable distance). A small tubercle (granulate or spinulose) on the epibranchial region. Hind margin beaded or granulate (not smooth as in Stebbing's and Ihle's figures). A deep groove from supra-orbital margin. Chelipeds granulate, outstanding spines on thumb and inner margin of hand, one or two also on finger. Dactyls of 4th and 5th legs about $\frac{3}{4}$ length of 6th joint, falcate, inner margin minutely denticulate. Pleopod 1 ♂ a simple sheath; pleopod 2 distally bent outwards, with a groove running to the acute apex.

Length 6 mm., breadth 9 mm.; length including doubled-up abdomen ♀ 11 mm.

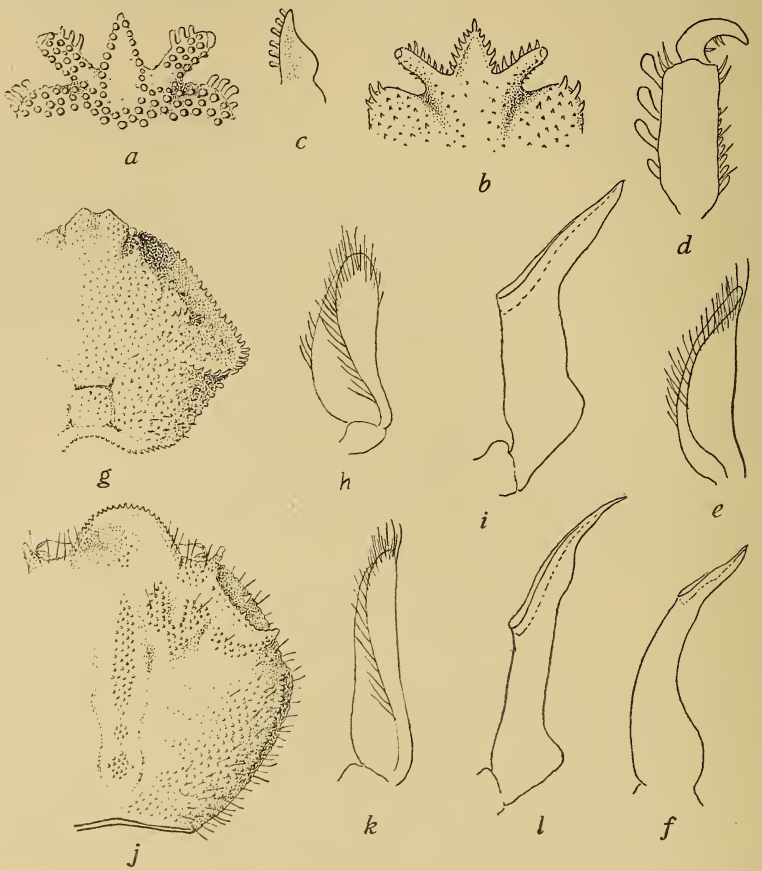


FIG. 74.—*Cymonomus trifurcus* Stebb. *a*, front of carapace with eye-stalks, adult. *b*, the same, juv. *c*, lateral view of rostrum. *d*, 6th joint and dactyl of 4th (or 5th) leg. *e*, pleopod 1 ♂. *f*, pleopod 2 ♂.
Corycodus disjunctipes (Stebb.). *g*, carapace ♂. *h*, pleopod 1 ♂. *i*, pleopod 2 ♂.
Xeinostoma eucheir Stebb. *j*, carapace ♂. *k*, pleopod 1 ♂. *l*, pleopod 2 ♂.

Localities.—Off Cape Natal (Durban), 62 fathoms (Stebbing); off Umhloti River mouth (Natal) and off Cape Vidal (Zululand), 80–100 fathoms (S. Afr. Mus.).

Distribution.—East Indies (5° 43′ N., 119° 40′ E.), 522 metres (Ihle).

Remarks.—Of the ♀♀ in the South African Museum collection, three contain respectively 7, 9, and 10 eggs, and three contain 5, 11, and 12 advanced embryos.

Gen. Xeinostoma Stebb.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 243.

Carapace about as broad as long, subcircular. Front broad, semicircular, concave, but not decurrent, not quite meeting apex of buccal cavity (a deep crevice between them). Mxp. 3 completely covering buccal cavity, palp not concealed, exopod without flagellum. Chelipeds robust, equal. 2nd leg inserted considerably behind base of cheliped. 6th and 7th joints of 2nd and 3rd legs closely fringed with long setae on hind margins. Abdomen in ♂ with segments 5–7, in ♀ segments 6 and 7, fused; in ♀ pleural portions of segments 2–5 narrowed, bearing the pleopods near their apices. Pleopod 1 ♂ a simple sheath for the slightly longer 2nd pleopod.

Remarks.—The structure of the ♀ pleon is remarkable and in strong contrast with the broad bowl-shaped pleon in *Cymonomus* and *Corycodus*. Possibly the specimen was not fully mature.

Xeinostoma eucheir Stebb.

Fig. 74, *j–l.*

1920. Stebbing, *l. c.*, p. 243, pl. 19 (Crust., pl. 99).

Carapace sparsely setose, chiefly around the lateral margins; branchio-cardiac grooves well marked; these, and other slight depressions, and the concave dorsal surface of front smooth, the raised areas finely granulate, especially near the margins where the granules become conical; front denticulate on margin, granulate submarginally. A prominent conical tubercle at outer angle of orbit, and another farther back nearer lateral rounded angle. Hind margin costate, smooth. Chelipeds granulate and setose, a prominent tubercle on outer surface of wrist, granules on hand mostly in rows and bands, with 3 intervening smooth grooves. Dactyls of 4th and 5th legs nearly as long as 6th joint, falcate, inner margin with a few setae. Pleopods 1 and 2 ♂ similar to those of *Cymonomus* and *Corycodus*.

Length (♂) 7 mm., breadth 8 mm. Length including abdomen as measured by Stebbing 9 mm.

Locality.—Off Cape Vidal, Zululand, 80–100 fathoms (Stebbing).

Remarks.—Only five specimens were obtained in the course of the survey by the s.s. *Pieter Faure.* Two ♂♂, including the one figured by Stebbing with 4th and 5th legs still attached, and a ♀ abdomen (on a slide) were returned to the South African Museum. I have figured the ♂, as Stebbing's representation of the surface sculpturing was not too detailed.

The remarkable fringes on the hind margins of the last two joints of the 2nd and 3rd legs would suggest natatory habits; or a habitat in mud, but the nature of the ground is recorded as "rock." Associated with this species were specimens of *Corycodus disjunctipes* and *Eurynome elegans.*

There is considerable resemblance to *Cyclodorippe agassizii* M. Edw., from the West Indies (*cf.* Rathbun, *l. c.*, p. 105, fig. 25, and pl. 32, fig. 5).

GYMNOPLEURA.

1922. Bourne, J. Linn. Soc. Lond., xxxv, pp. 55 *sqq.*

1937. Rathbun, Bull. U.S. Nat. Mus., no. 166, pp. 6–27.

Anterior thoracic sterna broad, posterior sterna narrow and keel-like. Posterior thoracic epimera largely exposed by reduction of the branchiostegite. Last pair of legs dorsal in position, normal or reduced in size. Male and female genital openings coxal, sternal grooves present in ♀. Gills 8. Exhalant branchial canals closed by the enlarged and modified exopod *and* endopod of mxp. 1.

Remarks.—Bourne's thesis sustains the views of Boas, and of M. Edwards and Bouvier, that the *Raninidae* should not be included in the *Oxystomata.*

Family RANINIDAE.

1910. Stebbing, *l. c.*, p. 339.

1918. Ihle, Siboga Exp. monogr., xxxix, *b*, 2, pp. 294–296, 298, 300, 306, 317–318.

1922. Bourne, *l. c.*, pp. 56 *sqq.*

1937. Rathbun, *l. c.*, p. 6.

Carapace longer than broad, greatest width in the anterior third. Abdominal terga narrow, most of them visible in dorsal view. Buccal cavity elongate, completely closed by mxp. 3. Chelipeds robust, hand usually broad and flat, the finger and thumb nearly at right angles to the long axis of hand. Legs with the 6th and 7th (dactyl) joints more or less flattened and foliaceous. Inhalant branchial canals between the 1st abdominal tergum and the coxae of 5th pair of legs.

Remarks.—There is a remarkable resemblance between these crabs and the sand-burrowing *Albuneidae.* The *Raninidae,* however, are distinguished by the narrowness of the first abdominal segment in contact with the carapace, and the shortness of the 1st antennae.

Key to the South African Genera.

1. Carapace evenly convex, with rostral point (fig. 75, *a*, *e*).
   a. Carapace scabrous. 5th leg subequal to 4th . . *Ranina*.
   b. Carapace smooth. 5th leg shorter and more slender than 4th . . . . . *Raninoides*.
2. Carapace roof-like, with median longitudinal ridge, and V-shaped excision instead of rostrum (fig. 75, *h*) . *Cosmonotus*.

Gen. Ranina Lam.

1910. Stebbing, *l. c.*, p. 339.

Carapace evenly convex, scabrous, with rostral point. Sternum very broad between bases of chelipeds, becoming rapidly very narrow between bases of 2nd legs; 3rd pair close behind 2nd pair; 5th pair inserted above and slightly in advance of, but subequal in size to, 4th pair. Dactyls of all legs foliaceous.

Ranina ranina (Linn.).

Fig. 75, *a–d*.

1851. Bianconi, Spec. Zool. Mosambic, fasc. 5, p. 86 (*dentata*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 814 (*dentata*, after Bianconi).

1910. Stebbing, *l. c.*, p. 339 (*scabra*).

1918. Ihle, *l. c.*, p. 295 (called *scabra*, though admitting the just priority of Linnaeus' name).

1931. Shen, Hong Kong Natural., ii, p. 103, fig. 9 and pl. 7.

Anterior profile in adult straight or slightly concave. Carapace closely covered with adpressed spiniform tubercles pointing forwards. Three teeth, separated by notches on either side of the triangular rostrum, the outermost bifid; 2 trifid processes on antero-lateral corner of carapace, the anterior one in adult ♂ very prominent and projecting beyond level of rostral point. In juv. (a specimen 20 mm. in length) anterior profile convex, the rostrum being the most forward point; the 2 trifid antero-lateral processes not nearly so prominent; carapace much more sharply spinate, the spines acute and not adpressed, anterior margin strongly spinulose, and a distinct medio-dorsal line of conical granules on rostrum. Cheliped with 2 spines on upper apex of wrist, 2 on upper outer margin of hand, 1 on base of finger followed by several smaller ones, 5 teeth on lower (inner) margin of hand.

Length up to 130 mm., breadth (excl. antero-lateral processes) 115 mm.

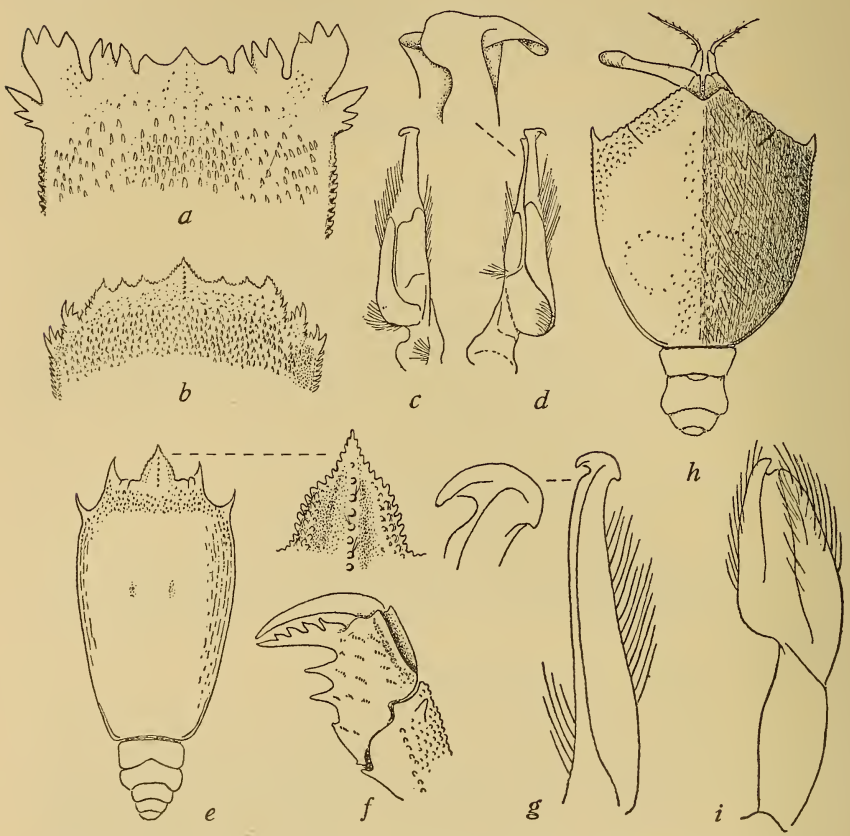


Fig. 75.—*Ranina ranina* (Linn.). *a*, anterior part of carapace, adult (length 130 mm.). *b*, the same, juv. (length 20 mm.). *c*, 1st pleopod ♂, outer view. *d*, the same, inner (median) view, with apex further enlarged.
Raninoides serratifrons Hend. *e*, carapace and abdomen (latter not fully extended) ♂, with rostrum further enlarged. *f*, chela. *g*, 1st pleopod ♂ from inner (median) side, with apex further enlarged.
Cosmonotus grayii Ad. & White. *h*, carapace and abdomen (latter not fully extended) ♂, right eye folded in. *i*, 1st pleopod ♂, inner view.

Localities.—Durban (Stebbing, and S. Afr. Mus.); Zululand coast, 24 fathoms (S. Afr. Mus.); Delagoa Bay (Lourenzo Marques Mus.); Mozambique (Bianconi).

Distribution.—Mauritius, Réunion, East Indies to China, Japan, and Sandwich Is. Apparently not found in India.

Gen. Raninoides M. Edw.

1918. Ihle, *l. c.*, p. 317 (list of species).

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 249.

1922. Bourne, *l. c.*, pp. 73–75.

1933. Chopra, Rec. Ind. Mus., xxxv, pp. 81–86 (doubts whether *Notosceles* Bourne is distinct).

1937. Rathbun, *l. c.*, p. 7.

1942. Ward, Mauritius Inst. Bull., ii, p. 47 (*Notosceles*).

Carapace evenly and strongly convex, mostly smooth (to the naked eye), with rostral point. Sternum moderately broad between bases of chelipeds and 2nd legs, but very narrow between bases of 3rd legs; distance between 2nd and 3rd pairs as great as that between 2nd and chelipeds; 5th legs inserted above and in advance of 4th legs, and markedly shorter and more slender than the latter. Pleopod 1 ♂ large, not concealed by abdomen, calcified; pleopod 2 shorter than pleopod 1.

Raninoides serratifrons Hend.

Fig. 75, *e–g*.

1906. Laurie in Herdman, Ceylon Pearl Fish. Rep. v, p. 367.

1920. Stebbing, *l. c.*, p. 250.

1933. Chopra, *l. c.*, p. 86, pl. 3, figs. 3, 3, *a*, and text-fig. 1, *c*.

Carapace sparsely pitted and minutely shagreened, becoming in anterior quarter squamulose-granulose and sparsely setose; rostrum with a slightly raised median line of granules; margins of rostrum and supra-orbital border serrulate or denticulate. Tooth on supra-orbital border between the 2 fissures not acute, outer orbital tooth spiniform. One spine on antero-lateral margin. Cheliped without spine on 3rd joint, wrist squamose-granulose, outer upper margin of hand bicarinate.

Length up to 22 mm., breadth 11·7 mm. (Henderson).

Locality.—Off Port Shepstone, Natal, 34 fathoms (Stebbing).

Distribution.—Ceylon, India, N.W. Australia.

Remarks.—Ward (*l. c.*, p. 47, pl. 4, figs. 5, 6) describes *viaderi* from Mauritius, closely allied to *serratifrons*.

Gen. Cosmonotus Ad. & White

1896. Alcock, J. Asiat. Soc. Bengal, lxv, p. 291.

1918. Ihle, *l. c.*, pp. 294, 306, 317.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 250.

Carapace strongly raised in medio-dorsal line, roof-like, nearly flat on either side; a V-shaped excision instead of a rostrum, in which the basal joints of the eye-stalks are visible. Second joint of eye-stalk elongate, flattened, lying in a groove extending nearly to the antero-lateral spinous tooth. Sternum broad between bases of chelipeds, very narrow between bases of 2nd legs. 5th pair of legs subequal to 4th. Pleopod 1 ♂ long, not completely concealed by abdomen.

Cosmonotus grayii Ad. & White

Fig. 75, *h*, *i*.

1918. Ihle, *l. c.*, p. 294.

1920. Stebbing, *l. c.*, p. 250.

Carapace smooth and polished, but rather closely pitted along medio-dorsal line, and minutely scabrous at antero-lateral corners. Supra-orbital margin minutely denticulate, with indications of 2 fissures. Cheliped, wrist with 1 apical denticle, outer and inner (upper and lower) margins of hand carinate, entire, finger (in adult) with a denticle in middle of inner margin. Pleopod 1 ♂ with distal portion forming a rather loosely folded sheath.

Length up to "about an inch" (Adams and White).

Locality.—Off Umvoti River mouth, Natal, 56 fathoms (Stebbing).

Distribution.—Dar-es-Salaam, Persian Gulf, East Indies, Formosa.

ANOMURA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 474, 475.

1909. Calman in Lankester, Treatise Zool. Crust., vii, p. 313.

1910. Stebbing, Gen. Cat. S. Afr. Crust., pp. 349, 367 (*Macrura Anomala* + *Thalassinidea*).

Body either crab-like or Macruran in general shape. Abdomen either bent more or less beneath carapace, or extended and not strongly calcified. Carapace not fused with epistome. Third pair of legs unlike the 1st, never chelate; 5th pair always reduced in size, sometimes also the 4th pair. Tail-fan often reduced. Uropods present or absent.

Remarks.—Stebbing (*l. c.*, p. 367) remarks that "Anomura" is not a fitting name for a group in which three tribes out of four have symmetrical "tails." The name may be ill-chosen, but morphology shows that the *Thalassinidea* are not to be included in the *Macrura Genuina*.

Key to the Divisions (Tribes).

1. 2nd–4th pairs of legs with last joint (dactyl) flattened for shovelling and burrowing. Abdomen bent under carapace, telson and uropods not forming a tail-fan . . *Hippidea.*
2. 2nd–4th pairs of legs with dactyl not flattened.
   a. Tail-fan developed, but uropods modified for holding the body into hollow objects (mollusc shells, etc.) (fig. 82). Abdomen soft, extended, usually twisted . . . . . *Paguridea.*
   b. Tail-fan well developed, uropods adapted for swimming (fig. 95, *h*). Abdomen symmetrical.
      i. Carapace depressed. Rostrum well developed. Abdomen calcified, more or less bent under carapace (figs. 87, 91, 92) . . . . *Galatheidea.*
      ii. Carapace compressed (figs. 93, 96). Abdomen soft, extended straight . . . . . *Thalassinidea.*

HIPPIDEA

Mole-crabs.

1904. Borradaile, F. Geogr. Mald. Laccad. Archip., ii, p. 750.
1910. Stebbing, *l. c.*, p. 365.
1924. Gurney, "Terra Nova" Rep. zool., viii, p. 187 (larvae).

Carapace ovoid or subquadrate, regions ill-defined. Cornea of eye small. First 4 pairs of legs with flattened terminal joint (dactyl), though that of 1st leg may be ovate, or linear, or elongate and multi-articulate. 5th pair very slender and feeble, inflexed. Abdomen partially extended, but the large telson bent under, the preceding segment with a pair of biramous uropods not adapted for swimming (not forming a tail-fan). No pleopods in ♂.

Remarks.—All the Mole-crabs dwell on sandy beaches and burrow with great rapidity. They burrow backwards. The very furry flagella of the 1st antennae and/or the 2nd antennae are adapted to the habitat in shifting sand, forming a filter to keep the stream of water to the gills clear of sand (Garstang, Quart. J. Microsc. Sci., xl, 1897, p. 224). Benedict (Proc. U.S. Nat. Mus., xxvii, 1904, p. 624) suggests that the furry flagella trap small particles of food washed along by the current. As the mandibles are feeble (Stebbing, Hist. Crust., 1893, p. 151), the food probably consists of small soft-bodied animals and plankton. Moore in studying the faecal pellets (Proc. Roy. Soc. Edin., liii, 1933, p. 252) found that they contained comparatively large particles of shell and sand; and regarded *Hippa* as a

typical "detritus-eater" like the majority of the *Anomura* (Moore, *l. c.*, lii, 1932, p. 296).

Key to the Families.

1. Carapace oval. Telson elongate, lanceolate. 1st pair of legs not subchelate. Mxp. 3 without exopod . . *Hippidae.*
2. Carapace quadrangular. Telson ovoid. 1st pair of legs subchelate. Mxp. 3 with exopod . . . . *Albuneidae.*

Family HIPPIDAE.

1910. Stebbing, *l. c.*, p. 365.

Outline of carapace in dorsal view oval. Mxp. 3 sub-operculiform, 4th joint very large; exopod absent. First pair of legs subcylindrical, not subchelate. Telson elongate, lanceolate.

Key to the South African Genera.

1. Carapace narrowly ovoid, very convex. Flagellum of ant. 2 large and long (fig. 76, *a*). Dactyl of 1st leg lamellate, ovate (fig. 76, *b*). Eye-stalks elongate . . . *Emerita.*
2. Carapace broadly ovoid, moderately convex. Flagellum of ant. 2 small. Dactyl of 1st leg cylindrical, styliform (fig. 76, *d*). Eye-stalks very short . . . . *Hippa.*

Gen. Emerita Meuschen.

1910. Stebbing, *l. c.*, p. 366.

1933. Menon, Bull. Madras Mus., n.s., III, 3, p. 34, figs. (development) (*Hippa*).

1934. *Id.*, J. Bombay Nat. Hist. Soc., xxxvii, p. 499, figs. ♂ ♀.

1935. Schmitt, New York Ac. Sci., xv, p. 210.

1937. *Id.*, Ann. S. Afr. Mus., xxxii, p. 25.

Carapace narrowly ovoid, strongly convex (barrel-shaped); frontal margin tridentate. Flagellum of ant. 2 large and long. Last joint of 3rd mxp. narrow, laminate. Dactyl of 1st leg ovate, lamellate. Eye-stalks elongate, very slender, the cornea forming a distinct knob.

Remarks.—According to Menon the ♂♂ of the Indian and American species are considerably smaller than the ♀♀: *asiatica*, ♂ 3·5–7·5 mm., ♀ 22–30 mm. He also found (in July) soft-shelled, *i.e.* recently moulted, ♀♀ with two or three ♂♂ attached between the thorax and abdomen. Alikunhi (J. Bomb. Nat. Hist. Soc., xlv, 1944, p. 94) says that the Indian species breeds throughout most of the year, with

maximum intensity in January to April; and that the young post-larval individuals are found in the finer sand near high-water mark, whereas the larger ones are in the coarser sand nearer low-water mark.

Emerita austroafricana Schmitt.

Fig. 76, *a*, *b*.

1910. Stebbing, *l. c.*, p. 366 (*emeritus*, non Linn.).

1912. Lenz, Ark. Zool., vii, no. 29, p. 5 (*asiatica*, non M. Edw.).

1917. Stebbing, Ann. Durban Mus., ii, p. 25 (*asiaticus*, non M. Edw.).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120 (*emeritus*, non Linn.).

1937. Schmitt, *l. c.*, pp. 25–29, pl. 3.

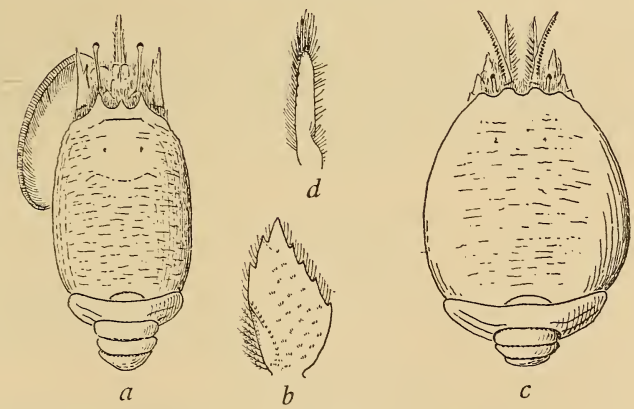


Fig. 76.—*Emerita austroafricana* Schmitt. *a*, carapace, flagellum of ant. 2 pulled out on one side. *b*, dactyl of 1st leg.
Hippa adactyla Fabr. *c*, carapace. *d*, dactyl of 1st leg.

Greater part of the downwardly projecting lateral portion of the carapace smooth, without transverse striae. Dactyl of 1st leg ovate, apically acute, the inner margin with 3–5, usually 4, dentations, outer margin with 1 or usually 2. Second joint of peduncle of ant. 2 smooth, the longest of its 3 spines extending beyond the subglobular 4th joint.

Length ♂ up to 35 mm., ovig. ♀♀ 23–37 mm. Pale pinkish grey, eggs orange.

Localities.—Amanzemtoti, S. of Durban (Lenz); Umkomaas, S. of Durban (S. Afr. Mus.); Durban Bay (Stebbing, Schmitt); Delagoa

Bay and Inhambane (Barnard); Masiene, Portuguese East Africa (S. Afr. Mus.); Impengazi, N. of St. Lucia Bay (coll. T. A. Stephenson).

Distribution.—Zanzibar, India (see *infra*).

Remarks.—Distinguished from *emeritus* (Linn.) by the dentate margins of dactyl of 1st leg (*cf.* figs. on pl. 3, Schmitt, *l. c.*, 1937). Schmitt (1935) showed that the *emerita* of Milne Edwards (1837) was wrongly identified, and that M. Edwards' *asiatica* was really the *emerita* of Linnaeus. Schmitt, however, appears to have overlooked Stebbing's 1917 paper in which he refers to the description of the dactyl of 1st leg given by Nobili (1903). If Nobili is accepted, it appears that the form with dentate dactyl extends to Zanzibar and India.

Gen. Hippa Fabr.

1910. Stebbing, *l. c.*, p. 365.

1920. *Id.*, Ann. Durban Mus., ii, p. 274.

Carapace broadly ovoid, moderately convex; frontal margin undulate. Flagellum of ant. 2 small. Last joint of mxp. 3 unguiform. 1st leg cylindrical, dactyl narrow linear, but not elongate or multiarticulate. Eye-stalks slender, but very short, expanding slightly and gradually to the cornea.

Hippa adactyla Fabr.

Fig. 76, *c*, *d*.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 206, pl. 21, figs. 14–20.

1912. Lenz, Ark. Zool., vii, no. 29, p. 5 (*Remipes ovalis* M. Edw.).

1920. Stebbing, *l. c.*, p. 274 (references).

1923. *Id.*, Fish. Mar. Biol. Surv. Rep., iii, Spec. Rep. 3, p. 5 (*pacificus*).

1939. Estampador, Philipp. J. Sci., lxix, pp. 348 *sqq.*, pls. 1–4 (anatomy) (*Remipes testudinarius*).

Frontal margin with 2 submedian lobes, flanked by a lateral lobe which (typically) is rounded and projects very little beyond the median lobes. Lateral margin with a submarginal series of short transverse setiferous pits.

Length up to 35 mm., breadth 32 mm. Pale greyish or pinkish brown, eggs orange-red.

Localities.—Amanzemtoti, S. of Durban (Lenz); Umgeni Lagoon and Durban beach (Stebbing); Durban Bay, Port St. Johns (S. Afr. Mus.).

Distribution.—Zanzibar, Red Sea, Mauritius, Réunion, to East Indies, Pacific islands and California.

Family ALBUNEIDAE.

1904. Benedict, Proc. U.S. Nat. Mus., xxvii, p. 621.

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 280 (references).

Outline of carapace in dorsal view subquadrangular. Flagellum of ant. 1 elongate. Mxp. 3 subpediform, 4th joint not enlarged, exopod present. First pair of legs subchelate. Telson not greatly elongate, ovate.

Gen. Albunea Fabr.

1904. Benedict, *l. c.*, p. 623.

1914. Stebbing, *l. c.*, p. 280.

1938. Gordon, Bull. Raffles Mus. Singapore, no. 14, p. 190 (comparison with *Lepidopa*).

A deeply concave median sinus on anterior margin of carapace, with (usually) a minute rostral point. Spine on antero-lateral corner situate on the lateral wall (not the dorsal shield) of carapace (*i.e.* ventral to the *linea anomurica*). Scaphocerite (scale or accessory joint) of ant. 2 elongate and slender. Eye-stalks lamellate, compressed, tapering to the very small cornea. Mxp. 3 with 4th joint (in Gordon's paper = antepenultimate joint or carpus) only shortly produced at outer apex.

Remarks.—There is a strong superficial resemblance to *Ranina*, which is also a sand-burrower, but *Albunea* is easily distinguished by its elongate 1st antennae, the lamellate eye-stalks, and the slender and feeble 5th pair of legs.

Albunea symnista (Linn.)

1878. Miers, J. Linn. Soc. Lond., Zool., xiv, p. 326.

1893. Henderson, Trans. Linn. Soc. Lond., v, p. 409.

1917. Stebbing, Ann. Durban Mus., ii, p. 26 (*guerinii*, non Lucas).

1937. Menon, Bull. Madras Mus., n.s., III, 5, p. 10, figs. (development.

1938. Gordon, *l. c.*, p. 187 (localities), figs. 1, *e*, 3, *f*, 4, *c*.

Anterior margin of carapace with (11) 12–14 spiniform teeth on either side of the median emargination, in which there is a small rostral denticle. Dactylus of 3rd leg slender, arcuate, with a prominent narrow lobe proximally (Gordon, *l. c.*, fig. 4, *c*).

Length up to 25 mm.

Locality.—Durban Bay (Stebbing).

Distribution.—Aden, Ceylon, India, Mascarenes, Nicobars, East Indies.

Remarks.—Although I have seen no specimens, I feel sure that the Durban specimen should have been identified with the Indian species rather than with one which has been recorded from the Mediterranean, west coast of Africa, and St. Helena. Stebbing says there were 10 (left side) + 13 (right) teeth on frontal margin in his Durban specimen, which conforms better with *symnista* than with *guerinii*, in which latter there are 8–9 on each side. He makes no reference to the character of the dactyl of 3rd leg, which appears to be an important diagnostic feature (*cf.* Gordon, *l. c.*).

PAGURIDEA.

1910. Stebbing, *l. c.*, p. 349.

1924. Gurney, "Terra Nova" Rep. zool., viii, p. 181 (larval stages).

Carapace ovate with well-defined regions; or elongate and feebly calcified behind the cervical groove. First pair of legs (chelipeds) chelate; 2nd–4th pairs well developed, 5th slender; or 2nd and 3rd well developed and 4th and 5th small. Abdomen nearly always asymmetrical, soft, twisted, or folded under carapace. Uropods (when present) adapted for holding the body in empty mollusc shells and other hollow objects.

Key to the Families.

1. Uropods absent. Carapace crab-like. 4th legs at least as well developed as the preceding legs . . . . *Lithodidae.*
2. Uropods present. 4th legs much shorter than the preceding legs.
   - *a.* Abdomen straight and symmetrical, with all the terga developed and in contact, with 5 pairs of symmetrical appendages in addition to the uropods . *Pomatochelidae.*
   - *b.* Paired appendages never present on all the abdominal segments (except in larval stages).
     - *i.* Flagella of ant. 1 ending in a filament (fig. 79, *c*); peduncle usually considerably shorter than length of carapace . . . . . *Paguridae.*
     - ii. Flagella of ant. 1 ending abruptly and bluntly (fig. 86); peduncle nearly as long as, or longer than, carapace. Terrestrial . . . *Coenobitidae.*

Family LITHODIDAE.

Stone Crabs.

1910. Stebbing, *l. c.*, p. 349.

Carapace crab-like, with abdomen folded underneath. Chelipeds well developed; 2nd–4th legs cylindrical, 5th slender, chelate, folded into the branchial chamber. Pleopods absent in ♂, more or less reduced in ♀. No uropods.

Remarks.—In *Lithodes* the development is abbreviated (Gurney, 1924, *l. c.*, p. 181).

Gen. Neolithodes M. Edw. & Bouv.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 69.

1910. *Id.*, *l. c.*, p. 349.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 37 (Megalopa stage).

Rostrum simple, with a pair of spines at its base dorsally. Eye-stalks short, cornea ventral. Acicle of antenna 2 rudimentary (normally). Right cheliped stouter, but not longer than left cheliped. 2nd abdominal segment composed of 5 pieces separated by sutures, the outermost sutures indistinct (less so in ♂ than in ♀), thus apparently only 3 pieces. Segments 3–5 covered with calcified nodules or conical tubercles, without intersegmental sutures, and in ♂ without distinctly separated lateral pieces, but in ♀ the lateral pieces of left side of each of the 3 segments enlarged and causing the abdomen to be much more asymmetrical than in the ♂. A pair of rudimentary appendages on 1st abdominal segment (close to bases of 5th legs), and unpaired appendages on left side on segments 2–5 in ♀; in ♂ no abdominal appendages.

Remarks.—The discovery of a Giant Stone-crab in South African waters was one of the noteworthy results of the survey made by the Cape Government trawler s.s. *Pieter Faure* under the directorship of Dr. Gilchrist. The ship's log-book shows that specimens (including juveniles) of this genus were trawled at the following stations:—

P.F. no. 16847. Cape Point N.E. × E. 36 miles, 660–700 fathoms, green mud, 2 juv. 9.vii.03 (in S. Afr. Mus.).

P.F. no. 17053. Cape Point N.E. × E.¼E., 46 miles, 900 fathoms, green mud. 21.vii.03. 1 specimen.

P.F. no. 17118. Cape Point N. 70° E., 40 miles, 800 fathoms, green mud, 10 specimens. 22.vii.03 (1 preserved in formalin, now in S. Afr. Mus.; 9 preserved dry, of which 2 sent to Stebbing; whereabouts of the others unknown).

P.F. no. 17175. Cape Point E.¾N., 38 miles, 630 fathoms, green mud, 1 juv. 29.vii.03 (sent to Stebbing, now in S. Afr. Mus.).

P.F. no. 17871. Cape Point N. 49° E., 38 miles, 475–550 fathoms, green mud, 1 specimen. 11.ix.03 (in S. Afr. Mus.).

P.F. no. 18043. Cape Point N.E., 40 miles, 560–700 fathoms, green mud, 1 juv. 17.ix.03 (in S. Afr. Mus.).

I do not know the present whereabouts of the two (type) specimens sent to Stebbing. The South African Museum possesses an ovigerous ♀ from the type locality, presumably the one specimen originally preserved in formalin.

The South African Museum also has one ♂ in formalin without serial number (possibly P.F. no. 17053), and P.F. no. 17871, which is a ♀ belonging to the *n. sp.* described below. This seems to have been the only specimen of this latter species collected by the *Pieter Faure*, and seems not to have been recognized at the time as different from those submitted to Stebbing.

At a much later date the South African Museum received a fine pair of this latter species from an area to the north of the Cape Point area. From this very limited evidence it might seem that the two species do not occur together, and that *capensis* occurs at greater depths. Against this, however, is the fact that all the juveniles appear to belong to the second species.

Benedict (1895, Proc. U.S. Nat. Mus., xvii, p. 479) has recorded the similar occurrence of two species on the east coast of North America: one, *agassizii* (S. I. Smith), with flattened and prickly legs at an average depth of 500 fathoms south of Cape Hatteras, and another, *goodei* (Benedict), with subcylindrical non-prickly legs at an average depth of 900 fathoms north of Cape Hatteras. The correlation of a decreased prickliness with increased depth and increase of latitude in the two regions is rather striking.

Key to the South African Species.

1. Only a few small scattered spines amongst the large ones on legs and chelipeds. Finger of right cheliped equal to upper margin of hand. Dactyls of 2nd–4th legs terete, evenly tapering (fig. 77, *b*) . . . . . *capensis.*
2. Very numerous and close-set small spines and prickles amongst the larger spines on chelipeds and legs. Finger of right cheliped 1½ times the length of upper margin of hand. Dactyls of 2nd–4th legs distally flattened, denticulate (fig. 77, *e*) . . . . . *asperrimus.*

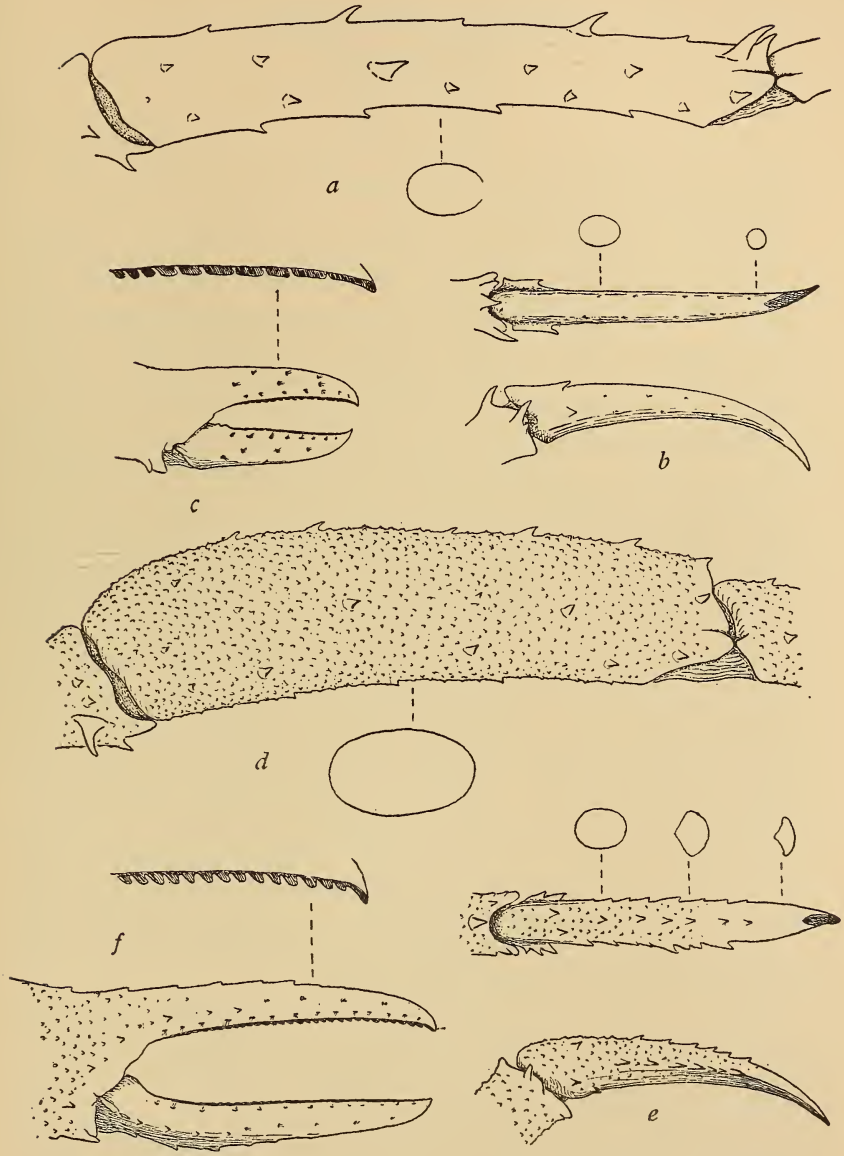


Fig. 77.—*Neolithodes capensis* Stebb. ♂. *a*, 4th joint of 4th leg, with cross-section. *b*, dorsal and lateral views of dactyl of 4th leg, with cross-sections. *c*, left chela, with cutting-edge of thumb further enlarged.
Neolithodes asperrimus Brnrd. ♂. *d*, *e*, *f*, as in *a*, *b*, *c* respectively.

Neolithodes capensis Stebb.

Cape Stone-crab.

Fig. 77, *a–c.*

1905. Stebbing, *l. c.*, p. 70, pls. 19, 20.
1910. *Id.*, *l. c.*, p. 349.

Small scattered spines amongst the larger ones on carapace, chelipeds, and legs. On carapace 6 prominent spines (hexagonally) on gastric region, 2 successive pairs followed by a single median one on cardiac region. Right cheliped: length of finger subequal to upper margin of hand (thumb corresponding); the sharp corneous edge in both finger and thumb less than the length occupied by the large white nodular teeth. Left cheliped: finger $1\frac{1}{2}$ times as long as upper margin of hand (thumb corresponding); the sharp corneous edge of finger continuous but obscurely serrulate proximally and with 2 minute nodular denticles at base, that of thumb divided into a number of quadrangular lobes, short proximally, but lengthening distally. 2nd–4th legs slender; greatest depth (*i.e.* between upper and lower surfaces) of 4th joint at base 5 times (♀ $4\frac{1}{2}$), least depth $7\frac{1}{2}$ times (♀ $5\frac{1}{2}$), in length of joint in 2nd leg; in the 3rd and 4th legs these ratios are respectively 6 and 8 (♀ $5\frac{1}{2}$ and 6); width (*i.e.* between inner or anterior and outer or posterior surfaces) of the joint 9 times (♀ 7) in the length of the joint in 2nd leg, $10\frac{3}{4}$ times (♀ $7\frac{1}{2}$) in 3rd leg, and 12 times (♀ $7\frac{1}{2}$) in 4th leg. The depth of the 6th joint in its shallowest part is contained 9, 11, and 12 times (♀ $7\frac{1}{2}$, $7\frac{1}{2}$, and $8\frac{1}{2}$) in its length in the 2nd, 3rd, and 4th legs respectively. Dactyls of 2nd–4th legs twice in length of the 6th joints, terete, tapering quite evenly to the apex, the cross-section near the apex being circular; dorsally and ventrally a corneous area at the apex representing the unguis. 2nd (coxal) joints of the legs only feebly dentate.

Length of carapace from apex of rostrum to hind margin: largest ♂ (S. Afr. Mus.) 150 mm., largest ♀ (Stebbing's type) 148 mm.; breadth 140 mm. and 116 mm. respectively. Length of 4th leg: 465 mm. and 350 mm. respectively. Deep red (*Pieter Faure* log-book).

Locality.—Cape Point N. 70° E., 40 miles, 800 fathoms, green mud (Stebbing, and topotype ♀ in S. Afr. Mus.); one ♂ (from which above measurements taken) without data (S. Afr. Mus.).

Remarks.—In the ovigerous ♀, eggs are attached to both the pleopods on 1st abdominal segments as well as to the other 4 pleopods.

Neolithodes asperrimus Brnrd.

Rough Stone-crab.

Fig. 77, *d–f.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 374.

Carapace with larger and smaller spines as in *capensis*, and similarly arranged, but all of them smaller; in addition whole upper surface thickly sprinkled with tiny sharp granules or prickles. The pterygostomial region, however, not more granulate than in *capensis*. Chelipeds and legs also thickly covered with prickles, more so in ♀ than in ♂. Right cheliped: length of finger 1½ times length of upper margin of hand, the sharp corneous edge in both finger and thumb equal to the length occupied by the nodular teeth. Left cheliped: length of finger twice length of upper margin of hand, the sharp corneous edge of finger continuous, but slightly serrulate proximally, no white nodular denticles at base, that of thumb divided into numerous, regular, bluntly-triangular serrations. 2nd–4th legs stout; greatest depth proximally 3½ times, least depth 4 times, in length of joint in 2nd leg (♂♀); in 3rd and 4th legs these ratios respectively 3½ and 4–4½ (♂♀); width of the joint 6½, 7, and 7 times in its length in the 2nd, 3rd, and 4th legs respectively (6 times in all 3 legs in ♀). Depth of 6th joint 7⅓, 8, and 8 times (♀ 6, 6½, 7) in its length in 2nd, 3rd, and 4th legs respectively. Dactyls of 2nd–4th legs 1⅗ in length of 6th joints, flattened distally, the lower surface distally with a rounded median ridge, with the surface on either side of it flat or slightly concave; dorsally and laterally denticulate; corneous area representing the unguis shorter than in *capensis*; the flattening and slight lateral expansion is more noticeable in the ♂ than in the ♀. 2nd (coxal) joints strongly dentate on lower distal margins. One of the spines on lower outer surface of 3rd joint of the legs, especially the 3rd and 4th, prominent, more so in ♀ than in ♂, and in both sexes more so than in *capensis*. Abdomen as in *capensis*.

Length of carapace: ♂ 180 mm., ♀♀ 152 and 128 mm.; breadth, ♂ 150 mm., ♀♀ 125 and 118 mm. Length of 4th leg: ♂ 490 mm., ♀♀ 380 and 340 mm.

Localities.—Off Saldanha Bay, 500 fathoms (Capt. Benson of the trawler *Ben Holden*, Cape Town, 1924) (♂ and the larger ♀, types); Cape Point N. 49° E., 38 miles, 475–550 fathoms (s.s. *Pieter Faure*, 1903) (the smaller ♀, P.F. no. 17871).

Remarks.—This species is at once distinguished from *capensis* by the

stout and prickly legs, the shape of the dactyls, and the more elongate fingers and thumbs of the chelipeds.

It is very close to *agassizii*, but seems to be distinguished by the noticeably greater stoutness of the 2nd–4th legs, especially the 4th joints, and slightly more elongate fingers and thumbs of the chelipeds; S. I. Smith (1882, Bull. Mus. Comp. Zool. Harvard, x, p. 11) gives measurements of right cheliped and its dactyl in 2 specimens as 55: 35 and 66: 44; but his figure shows the right finger only a little longer than upper margin of hand. According to the figure the greatest depth of the 4th joint of 4th leg in *agassizii* is 6 times in its length (as against 4–4½), and the depth of the 6th joint 10 times in its length (as against 7).

Juveniles.

The specimen, P.F. no. 17175, referred to by Stebbing (1905, p. 73, and 1910, p. 349, no. 174), is in the South African Museum, together with three other smaller specimens. Stebbing's hope of obtaining material intermediate in size between his specimen and the adults was never realized.

S. I. Smith (*l. c.*, p. 11, and pl. 1) in his description of *agassizii* concentrates largely on the spines in the adults and young, but as his figure of the adult conforms approximately to the measurements, it may be assumed that fig. 2 of the juvenile is also fairly correct. It shows the finger of the right chela subequal to, and that of the left chela 1½ times as long as, the upper margin of hand. Benedict (*l. c.*), who also relies largely on the spines for specific differentiation, claims the juveniles described by Smith as belonging not to *agassizii* but to *goodei*, but does not mention whether the latter is a "short-fingered" species as contrasted with the "long-fingered" *agassizii*. Milne-Edwards and Bouvier (1894, Res. Sci. Camp. Monaco, vii, pp. 62, 63) in describing *L. grimaldii* (transferred to *Neolithodes* on p. 91) also regarded Smith's juveniles as belonging to a species different from *agassizii*; their figure of the right chela shows the finger 1⅓ times as long as upper margin of hand, and thus differing from Smith's figure.

It is thus evident that far more material is necessary before the essential specific characters can be separated from the non-essential ones. Nevertheless, on the basis of the proportional length of the fingers and thumbs of the chelipeds, which appears to remain constant throughout life, whereas the length of the dactyls (*e.g.*) changes, I am provisionally assigning Stebbing's and the other three juvenile specimens to the new species *asperrimus*.

P.F. 18043. 1 ♀, carapace length 16 mm., of which median rostral point is 5 mm. 4th leg 26 mm. Dactyls of 2nd–4th legs almost as long as 6th joints, with a few minute granules proximally.

P.F. 16847. 1 ♂, 1 ♀, carapace length 22 mm., of which rostral point is 7 mm. 4th leg 36 mm. Dactyls of legs $1\frac{3}{4}$ times in length of 6th joints, with a few conical granules proximally in both sexes.

P.F. 17175. 1 ♀, carapace length 37 mm., of which rostral point is 10 mm. 4th leg 75 mm. Dactyls $\frac{3}{4}$ length of 6th joints, with denticles proximally.

In all the specimens the carapace is covered with long spines, but none of them as long as those of Smith's juveniles or of *grimaldii*, the chelipeds and 2nd–4th legs with long and short spines, denticles and prickles. The finger of left chela is twice, that of the right chela $1\frac{1}{2}$ times, the length of upper margin of hand, and the cutting-edge of the left thumb has the characteristic serrations of the adult.

The 2nd–4th legs are subcylindrical. The dactyls in the ♀♀ are terete, with a slight ridge on lower surface in the largest specimen, but in the ♂ showing the start of the flattening and lateral expansion distally which gives the characteristic shape to the dactyl in the adult. One of the spines on 3rd joint of 4th leg is especially prominent.

The genital orifices and the 4 pleopods on the left side are distinct in all three ♀ specimens, and even in the youngest specimen the abdomen is slightly asymmetrical. In the ♂ there are no pleopods. The pleopods are 2-jointed (peduncle and ramus), the 2nd joint being non-setose but tipped with a setule. Even in the largest specimen there is no trace of the pair of pleopods on 1st segment.

Family POMATOCHELIDAE.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 2 (*Pomatochelidae* pro *Pylochelidae*).

Body Macruran in shape, abdomen symmetrical, segmented, with well-developed tergal plates. First pair of legs chelate (chelipeds); 2nd and 3rd legs cylindrical, 4th and 5th legs small, minutely subchelate. Five pairs of pleopods in both sexes. Uropods present.

Gen. Pomatocheles Miers

1914. Stebbing, *l. c.*, p. 3.

Mxp. 3 approximate at base, not cheliform (*i.e.* 6th joint not produced in a thumb-like process). Eyes well developed. Gills 14 (on each side).

Pomatocheles balssi Stebb.

1914. Stebbing, *l. c.*, p. 3, pl. 1 (Crust., pl. 75).

Rostrum minute, acute. Eye-stalks about half total length of carapace. Palp of mx. 1 one-jointed. Chelipeds unequal, the left larger than the right. Telson symmetrical, apically incised.

Length of carapace 6 mm.

Locality.—Off East London, 80–130 fathoms, in the coral *Trochocyathus* (Stebbing).

Family PAGURIDAE.

Hermit-crabs.

1910. Stebbing, *l. c.*, p. 350, and p. 360 (*Glaucothoë*).

1912. Balss, D. Tiefsee Exp., xx, pp. 89 *sqq.* (biological notes, p. 116).

1939. Melin, K. Sv. Vet. Ak. Handl., xviii, no. 2, p. 12 (discussion of taxonomic characters, and key to genera).

Body Macruran in shape; carapace narrow, the hinder part membranous and soft; abdomen soft, imperfectly segmented, usually twisted and without definite calcified tergal plates. First pair of legs chelate (chelipeds); 2nd and 3rd cylindrical, 4th and 5th small, one or both of the latter subchelate or chelate. Pleopods reduced. Uropods present, asymmetrical and modified as hold-fasts. Flagella of ant. 1 ending in a filament.

Remarks.—The typical Hermit-crabs are all marine, and are found from the shore down to deep water. They inhabit hollow objects, usually the empty shell of a Gastropod mollusc, but sometimes a *Dentalium* shell or short lengths of water-logged bamboo stems or holes in rocks. Sometimes the shell is covered by Sea-anemones, Sponges, Alcyonarians, or Hydractinians, thus affording additional concealment to the crab.

Melin reduces some of the genera to subgenera, e.g. *Pagurus* sensu lato includes *Pagurus* s.s., *Aniculus* and *Petrochirus*; *Clibanarius* senso lato includes *Clibanarius* s.s., *Calcinus*, etc.; *Eupagurus* s.l. includes *Eupagurus* s.s., *Catapaguroides*, *Anapagurus*, etc. Without expressing any opinion on the merits of Melin's arrangement, all are here given generic rank.

Two subfamilies are accepted: the *Pagurinae* and the *Eupagurinae*.

Key to the Subfamilies and South African Genera.

Subfam. 1. Mxp. 3 approximate at base.* Chelipeds equal or subequal or the left vastly larger than the right (very rarely is the right *slightly* larger than the left, but not in any South African species) . . . . . *Pagurinae.*

I. Paired pleopods on 1st and 2nd abdominal segments ♂, on 1st segment ♀; 3 unpaired pleopods in ♂, 4 in ♀. 4th leg simple, not chelate (fig. 78, *d*). Gills 13 . *Paguristes.*

II. No paired pleopods in either sex. 4th leg chelate or subchelate (fig. 79, *a*).

A. Four unpaired (on left side) pleopods in ♂ and ♀.

1. Endopod of mx. 2 without flagellum. Finger and thumb of cheliped moving obliquely or nearly vertically. Gills 14.

a. Left cheliped usually the larger. Tips of finger and thumb slightly spooned, corneous . . . . . *Pagurus.*

b. Chelipeds subequal. Tips of finger and thumb hoof-shaped, corneous. Chelipeds and next 2 legs transversely ringed or scutellate . . *Aniculus.**

2. Endopod of mx. 2 with flagellum (in the S. African genera).

a. A small (immovable) rostral point. Tips of finger and thumb spooned.

i. Finger and thumb moving horizontally, tips corneous. Chelipeds subequal . . . *Clibanarius.*

ii. Finger and thumb moving obliquely or nearly vertically, tips calcareous. Left cheliped the larger . . . . . *Calcinus.*

b. Rostrum replaced by a movable scale or spine between the ophthalmic scales (fig. 81, *a*). Left cheliped vastly the larger. Tips of finger and thumb pointed, calcareous . *Diogenes.*

B. No pleopods in ♂; 4 unpaired (left side) in ♀. Chelipeds equal, angularly bent at wrist, and together with 2nd (or 2nd and 3rd) legs forming an operculum (fig. 82). Tail-fan symmetrical (or nearly so). Gills 14 (1 rudimentary, 1 unbranched) . . . . . *Cancellus.*

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* *Aniculus strigatus* has a very broad flat body and the 3rd maxillipeds are considerably separated at base.

Subfam. 2. Mxp. 3 widely separated at base. Right cheliped usually vastly larger than the left, the latter never *larger* than right, though sometimes subequal (but not in any South African genus) . . . . . *Eupagurinae.*

I. None, one or two pairs of pleopods in ♂; none or one pair in ♀. Gills 11.

A. ♂ with 2 pairs and 3 unpaired pleopods, ♀ with only 4 unpaired pleopods. Finger and thumb moving obliquely-vertically. Vas deferens not protruding . . . . . *Parapagurus.*

B. ♂ with only 3 unpaired pleopods, ♀ with 1 pair and 4 unpaired pleopods. Finger and thumb moving horizontally.

1. Vas deferens not protruding . . . *Pylopagurus.*
2. Vas deferens protruding . . . . *Nematopagurus.*

II. Paired pleopods absent in both sexes; 3–4 unpaired pleopods in ♂. Finger and thumb moving horizontally. Tail-fan asymmetrical. Gills 11 (in S. African species).

A. 4 unpaired pleopods in ♂ and ♀. 5th coxae symmetrical, vas deferens not protruding . . *Eupagurus.*

B. 3 unpaired pleopods in ♂, 4 in ♀.

1. Vas deferens protruding on right side, sabre-shaped (a short tube on left side) . . *Catapaguroides.*
2. Vas deferens protruding on left side only, sabre-shaped . . . . . *Anapagurus.*

The following synopsis may be useful as a first aid to identification:—

Mxp. 3 close together.

Left cheliped the larger: . *Pagurus, Diogenes, Calcinus.*

Chelipeds subequal . . *Paguristes, Clibanarius, Cancellus, Aniculus.*

Mxp. 3 separate.

Right cheliped the larger: All the South African genera in this subfamily.

Petrochirus bahamensis (Herbst) has once been recorded from South Africa, but probably by some error in labelling (see p. 3).

Development.—The first larval stage is a *Zoea*, with long pointed rostral process, and acute postero-lateral angles of carapace.

The post-larval stage is known as the *Glaucothoë*, of which two stages are recognized: one free-swimming (pelagic) with paired pleopods, the other benthic with the pleopods of the right side atrophied.

Glaucothoë was formerly regarded as a distinct genus of adult forms, but these have since been recognized as larval stages of various Pagurids.

An abbreviated development is known in a species of *Paguristes*, and a further case is described below for *Cancellus*.

Glaucothoë M. Edw.

1891. Bouvier, Ann. Sci. Nat. (7), xii, p. 65.
1910. Stebbing, *l. c.*, p. 360.
1910. Issel, Archiv. zool. Naples, iv, p. 335.
1924. Gurney, "Terra Nova" Rep. Zool., viii, pp. 181–187.
1926–27. Balss in Kükenthal, Handb. Zool., iii, p. 924, fig. 1025.

Rostrum present or absent. Ocular scales absent. Mxp. 3 close together or separated. Chelipeds equal, or one much larger than the other, fingers opening obliquely. Abdomen symmetrical, straight, the tergal plates more strongly chitinized than the sternites. Five pairs of pleopods on segments 2–5. Uropods and telson symmetrical.

Glaucothoë peronii M. Edw.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 307.
1924. Gurney, *l. c.*, p. 183, fig. 72.
Locality.—35° 55′ S., 17° 6′ E., 1014 fathoms (Gurney).
Distribution.—N. and S. Atlantic, Pacific.
Remarks.—The adult of this form is not known.

Gen. Paguristes Dana

1910. Stebbing, Gen. Cat. S. Afr. Crust., p. 351.
1920. *Id.*, Ann. S. Afr. Mus., xvii, p. 257.
1923. Odhner, K.V.V. Samh. Handl. Göteb., xxvii, 5 (=Medd. Göteb Mus. Zool. Avd. 31), p. 6.
1939. Melin, *l. c.*, p. 18 (in key).

Rostrum usually well developed. Eye-stalks long, ophthalmic scales well developed. Chelipeds equal, or one (usually the left) larger than the other, fingers opening in a horizontal plane, tips of fingers and thumbs usually corneous. Telson lop-sided to the left. The first pair of abdominal appendages in ♂ lie close up against or between the bases of the 5th thoracic legs.

Remarks.—Distinguished from all other South African genera by the 4th pair of legs being simple (not subchelate), with terminal dactyl.

Tropical and subtropical, mostly Indo-Pacific; littoral, but many species also from a depth of 100 or more fathoms (Alcock).

Odhner (*l. c.*) has recorded two species from Port Alexander, Angola:

oculatus var. *brunneo-pictus* M. Edw. & Bouv., and *skoogi* Odhner. The former is a Mediterranean and N.W. African species, but owing to lack of literature I am unable to include it in the key, or to give a description of it.

Key to the South African Species.

I. Flagellum of antenna 2 shorter than carapace.
  A. Ocular scales far apart. Eye-stalks cylindrical.
    1. Eye-stalks and peduncle of antenna 1 subequal, and longer than peduncle of antenna 2.
      a. Rostrum blunt. Outer surface of chelae with sparsely set small tubercles . *gamianus.*
      b. Rostrum sharp. Outer surface of chelae closely set with large tubercles . . *rosaceus.*
    2. Eye-stalks and peduncle of antenna 2 subequal, shorter than peduncle of antenna 1 . . *skoogi.*
  B. Ocular scales close together. Eye-stalks narrowing distally . . . . . *engyops.*
II. Flagellum of antenna 2 longer than carapace . . . sp. cf. *ciliatus.*

Paguristes gamianus (M. Edw.)

Fig. 78, *a–d.*

1910. Stebbing, *l. c.*, p. 351.
1912. Balss, Wiss. Erg. D. Tiefsee Exp., xx, p. 91, fig. 2.
1920. Stebbing, *l. c.*, p. 257.

Rostral projection bluntly triangular, not prominent and not extending beyond level of lateral points. Eye-stalks shorter than width of carapace, subequal in length to peduncle of antenna 1 (if latter is extended), but longer than peduncle of antenna 2, cylindrical cornea about equal to width of stalk at base; scales far apart, ovoid, apex acute, outer margin crenulate. Antenna 2, outer apex of 2nd joint with 2 contiguous spines, scale projecting forwards or outwards with 2 spines on outer margin, 3 on inner, apex bifurcate, ultimate joint of peduncle elongate.

Chelipeds densely hirsute (with plumose setae), upper and lower margins of 4th joint serrate, wrist with conical tubercles, outer surface of hand with rather sparsely arranged small tubercles or denticles, finger and thumb in contact throughout. 2nd and 3rd legs densely hirsute. Upper margin of 5th and 6th joints of 2nd and 3rd legs spinose, dactyls longer than 6th joint.

Carapace length 7–8 mm.

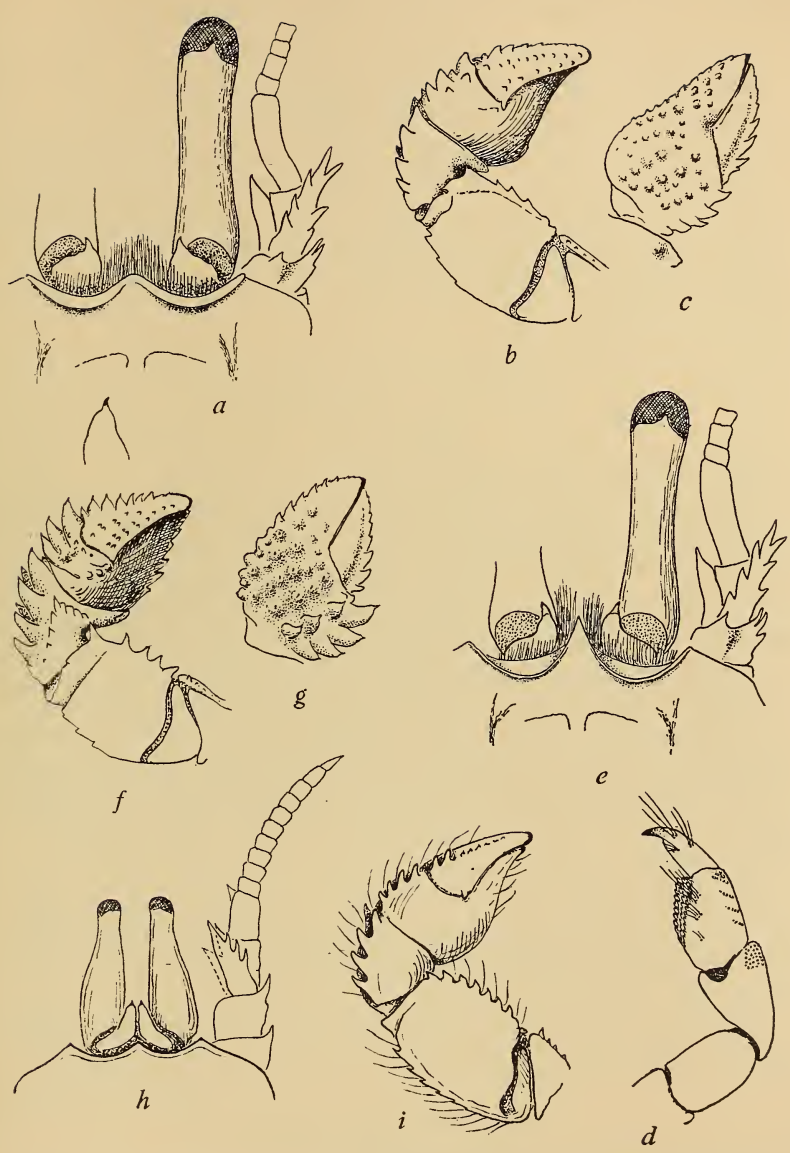


FIG. 78.—*Paguristes gamianus* (M. Edw.). *a*, front of carapace, with ocular scales, right eye, and ant. 2 (setae on latter omitted). *b*, inner view of left cheliped (denuded). *c*, outer view of left chela. *d*, outer view of left 4th leg, marginal plumose setae omitted.

Paguristes rosaceus Brnrd. *e*, front of carapace, with ocular scales, right eye, and ant. 2 (setae on latter omitted). *f*, inner view of left cheliped. *g*, outer view of left chela.

Paguristes engyops Brnrd. *h*, front of carapace, with ocular scales, eyes, and right ant. 2 (setae on latter omitted). *i*, inner view of left cheliped.

Localities.—Cape of Good Hope (M. Edwards); Natal coast, 50 fathoms (Stebbing); Agulhas Bank, 155 metres (Balss).

Remarks.—I have examined the specimen seen by Stebbing. It appears to agree with the specimens described and figured by Balss. I rather doubt whether this is the species described by M. Edwards, which is far more likely to have been based on a specimen of the next species (*rosaceus*), which is a common *littoral* species.

The matter, however, can only be settled by examination of the type (if extant).

Paguristes rosaceus Brnrd.

Fig. 78, *e–g*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 375.

Differs from the species described above (as *gamianus*) as follows: rostral projection sharply triangular, projecting well beyond the lateral points; peduncle of antenna 2 slightly longer (but not reaching to base of cornea); ophthalmic scales crescent or **L**-shaped, with concave outer margin and conspicuous apical point; outer surface of wrists and hand of chelipeds with large conical tubercles, each with a blackish corneous apical point, their bases contiguous or nearly so.

Carapace length up to 9 mm. Anterior part of carapace, and the eye-stalks, antennae, chelipeds, and 2nd and 3rd legs rose-red or carmine or speckled with crimson, distal half of dactyls of 2nd and 3rd legs white, ungues and tips of finger and thumb of chelipeds brown, cornea black.

Localities.—Keurbooms River (Plettenberg Bay) (S. Afr. Mus.); False Bay, Danger Point, Knysna, Plettenberg Bay, Jeffreys Bay, Port Elizabeth, and Port Alfred (Professor T. A. Stephenson coll.). Littoral.

Remarks.—The ♀♀ carry 12–15 eggs, measuring 1·3 mm. major diameter.

Paguristes skoogi Odhner

1923. Odhner, *l. c.*, p. 6, pl. 1.

Very like the species described above as *gamianus*, but the eye-stalks are subequal to the peduncle of the *second* antenna, and *both are shorter than the peduncle of the first antenna.*

Carapace length 6·75 mm.

Locality.—Port Alexander, Angola, 72 metres (Odhner).

Paguristes engyops Brnrd.

Fig. 78, *h*, *i*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 375.

Rostral point broadly triangular, not extending beyond level of lateral points. Eye-stalks shorter than width of carapace, about equal to distance between lateral points on front margin, shorter than peduncle of antennae 1, but subequal to that of antenna 2, somewhat flask-shaped, narrowing distally, the cornea small; scales L-shaped, with acute apices, approximate. Antenna 2, 2nd joint with single spine on outer apex, scale projecting inwards, with 2–3 teeth on outer margin, none on inner margin, a strong tooth on lower margin of both 3rd and 4th joints, 5th joint not much longer than penultimate joint, with small tooth on lower apex, flagellum subequal to peduncle, shorter than half length of carapace, stout.

Chelipeds subequal, robust, sparsely setose, upper and lower margins of 4th joint, and upper inner margins of wrist and hand with strong denticles, finger with 2 moderate and several minute denticles on its free edge, a few conical granules on outer surface of hand, a very slight gap at base between finger and thumb. 2nd and 3rd legs densely setose (plumose) on upper and lower margins, 5th and 6th joints with upper margin spinose, dactyls subequal to 6th joint.

Carapace length 2·5 mm., total length 5·5 mm. Creamy or buff, the anterior part of the carapace, and the chelipeds and legs faintly pinkish, cornea brown.

Localities.—Buffels Bay, False Bay, littoral, in various shells of the family *Trochidae* (K. H. B., March 1915, ♂♂ and ovig. ♀♀); Paternoster, N. of Saldanha Bay, and Hermanus (Professor T. A. Stephenson coll.).

Remarks.—The ♀♀ carry 3 or 4 very large eggs, measuring in major diameter 1 mm.

Paguristes sp.

1920. Stebbing, *l. c.*, p. 257.

Stebbing compares a single specimen in poor condition with *ciliatus* Heller, originally described from the Nicobar Islands.

Locality.—Off Gt. Fish Point, 49 fathoms (Stebbing).

Gen. PAGURUS Fabr. (sensu restricto).

1775. Fabricius, Syst. Entomol., p. 410 (*Pagurus* part).
1875. Paulson, Red Sea Crust., p. 90 (*Dardanus*).
1910. Stebbing, Gen. Cat. S. Afr. Crust., p. 350.
1917. *Id.*, Ann. Durban Mus., ii, p. 20.
1921. Balss, Beitr. Meeresf. Westafr., iii, p. 43.
1926. Schmitt, Bull. Amer. Mus., liii, p. 45 (*Dardanus*).
1938. Yap-Chiongco, Philipp. J. Sci., lxvi, p. 194.

Rostrum absent. Eye-stalks stout; ophthalmic scales large, widely separated. Chelipeds (with few exceptions, none S. African) unequal, the left greatly the larger; finger opening in an obliquely-vertical plane, tips of finger and thumb corneous. Telson lop-sided to left. In ♂ a small, uniramous appendage on each of abdominal segments 2–5; in ♀ the appendages on segments 2–4 are triramous, that of segment 5 is small and uniramous.

Remarks.—Tropical and subtropical; mostly littoral and shallow water, *P. arrosor* being the only species descending below 100 fathoms.

Adequate reasons for the substitution, mostly by American writers, of *Dardanus* for *Pagurus* (in its restricted sense) have yet to be given.

Key to the South African Species.

I. Upper and outer surfaces of chelae and legs with more or less regular transverse, scutelated striae, edges of the scutes with short close-set setae (fig. 79, *a*) . . . *arrosor.*

II. Chelae and legs not thus sculptured (legs sometimes, but never the chelae).

A. Eye-stalk reaching nearly to, or beyond, end of peduncle of antenna 1, cornea less than ⅓ length of eye-stalk.

1. Greatest breadth of carapace across branchial region less than median length of carapace.

a. Left cheliped vastly larger and longer than right.

i. Whole outer surface of hand of left chela spinose.

α. Outer surface of propod of 3rd left leg spinose. Carapace and legs ocellated (fig. 79, *c*) *megistos.*

β. Propod and dactyl of 3rd left leg broadened, outer surface flattened and regularly tesselated (fig. 79, *d*) . *setifer.*

ii. Outer surface of hand smooth, except a few spinules along upper margin . . . . . *fabimanus.*

b. Left cheliped decidedly larger but not much longer than right. Chelipeds and legs hairy and spinose, with a bald patch on upper surface of wrists (5th joints). Joints of distal half of flagellum of antenna 2 strongly gibbous . *euopsis.*

2. Greatest breadth of carapace equal to median length. Left cheliped moderately larger than right. Chelipeds and legs hairy. Outer surface of last two joints of 3rd left leg transversely striated . . . . *guttatus.*

B. Eye-stalk very short and stout, not nearly reaching end of peduncle of antenna 1. Cornea $\frac{1}{3}$ or more length of eye-stalk.

1. Inner border of upper surface of dactyl of left cheliped sharply cristiform. Outer surface of dactyl of 3rd left leg without a keel . *deformis.*

2. Upper surface of dactyl of left cheliped with longitudinal rows of polished granules only. Outer surface of dactyl of 3rd left leg with a longitudinal keel (fig. 79, *e*).

a. Upper edge of outer surface of propod of 3rd left leg well defined, subcristiform . *pedunculatus.*

b. Upper edge of outer surface of propod of 3rd left leg hardly defined . . . *asper.*

Pagurus arrosor (Herbst)

Fig. 79, *a.*

1910. Stebbing, *l. c.*, p. 350.
1912. Balss, D. Tiefsee Exp., xx, p. 95.
1913. *Id.*, Schultze Reise, v, p. 109.
1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 276.
1921. Balss, *l. c.*, p. 43.
1922. Bouvier, Res. Sci. Camp. Monaco, fasc. lxii, p. 15.
1923. Odhner, Medd. Göteb. Mus., xxxi, pp. 8, 25.
1926. Schmitt, *l. c.*, p. 45, fig. 69, B, E, H (chela and leg).
1927. Hale, Crust. S. Austral., pt. 1, p. 93, fig. 89 (*Dardanus a.*).
1933. Monod, Bull. Et. Sci. Afr. occid. Fr., xv, p. 25 (pagination of separate copy).

The sculpturing of the chelipeds and legs is characteristic. (A somewhat similar sculpturing is found in *Aniculus.*)

Median length of carapace up to ♂ 50 mm., length from front margin of carapace to end of telson about 130 mm. Salmon-pink or reddish.

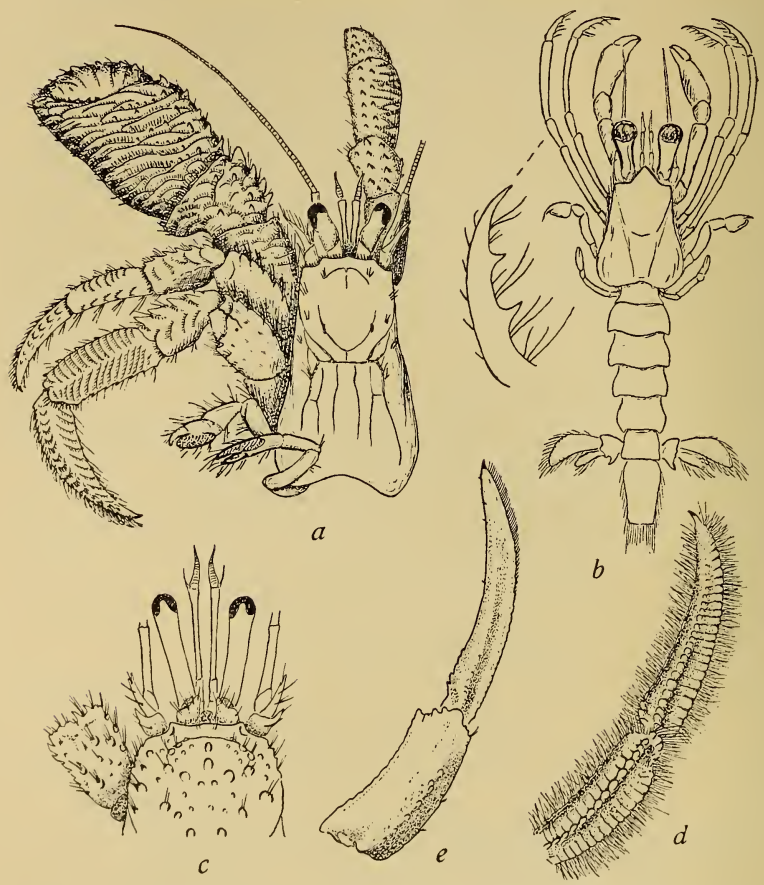


Fig. 79.—*Pagurus arrosor* (Herbst). *a*, carapace, chelipeds (the right one foreshortened in perspective), and 2nd–5th legs of left side. *b*, *Glaucothoë* stage, with dactyl of 2nd leg further enlarged.
Pagurus megistos (Herbst). *c*, anterior part of carapace, with 4th joint of left cheliped.
Pagurus setifer M. Edw. *d*, outer view of 6th and 7th (dactyl) joints of 3rd leg of left side.
Pagurus pedunculatus (Herbst). *e*, outer view of 6th and 7th joints of 3rd leg of left side.

Localities.—Table Bay (Stebbing); False Bay and Agulhas Bank to Natal, 20–92 fathoms (Stebbing, Odhner and S. Afr. Mus.); St. Lucia Bay (S. Afr. Mus.); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—West Indies, Brazil; Mediterranean, Cape Verde Is.,

Madeira, west coast of Africa to Port Alexander, Angola; Philippine Is., Japan, Australia.

Remarks.—The largest specimen in the South African Museum is a ♂ whose dimensions are given above.

Inhabits various shells, to which Sea-anemones (*Calliactis polypus*) are attached; sometimes also in the more or less spherical ball-like sponge *Suberites domuncula.*

The form *pectinatus* Ortm. is given specific rank by Schmitt (*l. c.*, p. 45, figs.). The extreme form is easily distinguished from typical *arrosor*, but certain specimens in the South African Museum series seem to indicate that transitions may occur.

Glaucothoë stage

Fig. 79, *b.*

Frontal margin triangularly produced. Eye-stalks equal to anterior width of carapace, cornea dilated. Left cheliped larger than right, smooth and unsculptured, glabrous except for a few setules on finger and thumb, the tips of which are corneous. 2nd and 3rd legs elongate and slender, glabrous except for some setae on the dactyls, the lower margin of which bears two spiniform processes. Posterior margin of peduncle of uropod produced in an acute process. Telson twice as long as wide, slightly tapering to the truncate apex.

Localities.—Off Cove Rock (East London), 25 fathoms, 1 specimen, carapace length 4 mm.; False Bay, 1 specimen, carapace length 4·5 mm., together with several *arrosor* in sponges.

Remarks.—Apart from one specimen having been found in actual association with adults of *arrosor*, the size would exclude *Diogenes*; and *Calcinus* (the only other genus with mxp. 3 close together and the left cheliped larger than the right) is not found so far west as False Bay. It seems highly probable, therefore, that these two *Glaucothoë* belong to *arrosor.*

The smallest *arrosor* of adult form which I have seen has a carapace length of 7 mm.

Pagurus megistos (Herbst)

Fig. 79, *c.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 814 (*punctulatus*).
1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 376 (*punctulatus*).
1910. Stebbing, *l. c.*, p. 350.

1917. *Id.*, Ann. Durban Mus., ii, p. 21.

1927. Hale, S. Austral. Crust., pt. 1, p. 92, fig. 88 (*Dardanus m.*).

1938. Yap-Chiongco, *l. c.*, p. 197, pl. 1, fig. 3 (*punctulatus*).

Eye-stalks not quite as long as width of carapace. Outer surfaces of wrist, hand, and fingers of chelipeds, and of the last 3 joints of 2nd and 3rd legs densely covered with long coarse, reddish or brownish, bristles; upper surfaces of wrist and hand of chelipeds also with strong black-tipped spinous tubercles, more or less hidden under the bristles. Dactyl of 3rd leg convex on outer surface.

Length of carapace up to 70 mm. Carapace, chelipeds, and legs red or reddish, with numerous white or bluish-white, black-edged ocelli; eye-stalks maroon, cornea black.

Localities.—Mozambique (Hilgendorf); Durban Bay (Stebbing); Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius, Red Sea, east coast of Africa, Indo-Pacific to Australia and Hawaiian Is.

Pagurus setifer M. Edw.

Fig. 79, *d.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 816, pl. 3, figs. 1–5 (*pavimentatus*).

1894. Ortmann, Semon's Austral. Reise, v, p. 30.

1905. Alcock, Cat. Crust. Ind. Mus., ii, p. 83, pl. 8, fig. 3.

1921. Balss, K. Sv. Vet. Ak. Handl., lxi, no. 10, p. 19.

[not *setifer* Hilg. = *guttatus*.]

Eye-stalks as long as width of carapace. Upper surfaces of wrist, hand, and fingers of chelipeds, and of distal joints of 2nd and 3rd legs densely covered with longish bristles; upper surface of wrist and hand of cheliped also with (black-tipped) spinous tubercles. On hand of larger cheliped the bristles form wreaths around the bases of the tubercles, and along the lower margin the spines are grouped in palisade fashion (best seen from inside). Last 2 joints of 3rd left leg broadened, with crenulate upper and lower margins; outer surface flattened and concave, with a longitudinal ridge or keel, the surface with pavement-like sculpture of regular transverse grooves or tesselations.

Length of carapace up to 47 mm. Yellowish or reddish, chelipeds and legs yellowish with reddish patches tending to form cross bands, chiefly visible on the 4th and 5th joints; bristles shining green.

Localities.—Off Port Shepstone, Natal, 24 fathoms, and Durban (S. Afr. Mus.).

Distribution.—Ibo, Portuguese East Africa; Mauritius; East Indies, Hong Kong, Japan, Australia.

Remarks.—The 3rd left leg is characteristic. The Natal specimens agree better with Hilgendorf's description and figure than with Alcock's.

Pagurus fabimanus Dana

1852. Dana, Proc. Ac. Nat. Sci. Philad., p. 270, and U.S. Expl. Exp., Crust., i, p. 454, pl. 28, figs. 7, *a–e.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 819.

1905. Alcock, *l. c.*, p. 84, pl. 8, fig. 2.

1938. Yap-Chiongco, *l. c.*, p. 199, pl. 1, fig. 2 (not good).

Eye-stalk equal, or almost, to anterior width of carapace. Upper surface of wrist, hand and finger of larger cheliped spinose and setose, elsewhere smooth. Legs finely scabrous. Outer surface of dactyl of 3rd left leg flattened, longitudinally grooved, its upper and lower margins sharply defined.

Length of carapace up to 25 mm. Colour as in *setifer*, but the rusty-red patches fainter (Alcock).

Distribution.—Ibo, Portuguese East Africa (Hilgendorf); east coast of Africa, Laccadives and Maldives, Philippine Is., Fiji.

Remarks.—Not yet found within our limits, but almost certainly occurs south of Ibo.

Pagurus euopsis Dana

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 814 (*depressus*).

1905. Alcock, *l. c.*, p. 86, pl. 9, fig. 2.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 376.

1917. Stebbing, Ann. Durban Mus., i, p. 439 (*enopsis* typ. err.).

1917. *Id.*, *ibid.*, ii, p. 20.

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 157.

1938. Yap-Chiongco, *l. c.*, p. 200, pl. 1, fig. 7.

Eye-stalks much longer than anterior width of carapace. Carapace depressed (especially in var. *depressus*). Joints of the distal half of flagellum of ant. 2 with their antero-internal angles produced. Chelipeds and legs with long stiff brownish or red-and-white bristles as in *megistos*, but the spinose tubercles much less numerous.

Length of carapace up to 35 mm. Reddish, somewhat mottled, chelipeds and legs slaty, spotted with red and white; a broad maroon

cross band on 4th and 5th joints of 2nd and 3rd legs; bristles apically greenish. (No ocellate spots.)

Locality.—Durban Bay (Stebbing).

Distribution.—Ibo, Portuguese East Africa; east coast of Africa, Red Sea, Aldabra, Andamans, to Samoa.

Pagurus guttatus Olivier

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 815, pl. 3, fig. 8 (*setifer*, non M. Edw.).

1905. Alcock, *l. c.*, p. 87, pl. 9, fig. 1 (references).

1912. Balss, D. Tiefsee Exp., xx, p. 95.

1938. Yap-Chiongco, *l. c.*, p. 200, pl. 1, fig. 13.

Carapace greatly depressed, breadth equal to length. Eye-stalk about $\frac{2}{3}$ anterior width of carapace, cornea very short. Chelipeds and legs, especially the last two joints, with long yellow bristles, forming a particularly long and thick fringe on upper and lower margins of 3rd left leg. Wrist of cheliped and 5th joints of 2nd and 3rd legs with a characteristic bald patch on upper surface. Last 2 joints of 3rd left leg with outer surface flattened, longitudinally grooved near upper margin, with regular transverse striae or grooves.

Length of carapace up to 50 mm. Brownish, reddish or crimson, with white markings and dots (not ocelli), the bare patches on the chelipeds and legs nearly white.

Locality.—Natal (Fishery Survey, 1948).

Distribution.—Ibo, Portuguese East Africa; east coast of Africa, Indian Seas, to Hawaiian Is.

Pagurus deformis M. Edw.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 818, pl. 3, figs. 6, 7.

1905. Alcock, *l. c.*, p. 88, pl. 9, fig. 4 (references).

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 376.

1917. Stebbing, Ann Durban Mus., ii, p. 20.

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 157.

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 28, pl. 5.

1938. Yap-Chiongco, *l. c.*, p. 195, pl. 1, fig. 10 (not good).

Carapace not much depressed, longer than broad. Eye-stalks depressed, broadened distally, about $\frac{2}{3}$ anterior width of carapace, cornea large, $\frac{1}{2}$–$\frac{2}{5}$ length of eye-stalk. Chelipeds and legs sparingly setose. Left cheliped vastly the larger, 4th joint with lower border alate and strongly serrate, wrist and hand with strong tubercles,

inner upper edge of finger forming an upstanding crenulated crest. Last 2 joints of 3rd left leg with upper outer margin sharply cristate, forming a crenulated crest overhanging the concave outer surface of the joints.

Length of carapace up to 38 mm. Yellowish, often with reddish cross bands on eye-stalks and legs.

Locality.—Durban Bay (Stebbing); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Ibo, Portuguese East Africa; Mauritius; east coast of Africa, Indian Seas to Tahiti.

Remarks.—Characteristic of this species is the fact that males possess genital openings on the bases of the 3rd pair of legs, corresponding with those of the female, in addition to the true male openings on the bases of the 5th pair.

Pagurus pedunculatus (Herbst)

Fig. 79, *e*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 815.
1881. de Man, Notes Leyden Mus., iii, p. 129 (*varipes*).
1894. Ortmann, Semon's Austral. Reise, v, p. 31, and footnote.
1905. Alcock, *l. c.*, p. 90, pl. 9, fig. 7 (*varipes*).
1917. Stebbing, Ann. Durban Mus., ii, p. 21 (*varipes*).

Differs from *deformis* as follows: upper surface of dactyl of left cheliped with several rows of polished granules and no upstanding crest on inner upper margin; outer surface of dactyl of 3rd left leg longitudinally carinate near lower margin; no male openings corresponding with those of female on 3rd legs.

Length of carapace up to 45 mm. Flesh-red, upper parts of chelae violaceous, fingers rosy, legs orange and white.

Localities.—Mozambique (Hilgendorf); Durban Bay (Stebbing, and S. Afr. Mus.); Delagoa Bay (coll. van der Horst).

Distribution.—Red Sea, east coast of Africa, Indian Seas, Malay Archipelago.

Remarks.—Hilgendorf regards *varipes* Heller as a variety of *pedunculatus*, the former being without the longitudinal groove on outer surface of hand of chela which is present in Herbst's type specimens. Ortmann adopts Herbst's specific name, but neither Alcock nor Stebbing follow him.

In two specimens from Durban Bay (S. Afr. Mus.) there is a faint keel on 6th joint of 3rd left leg; in the absence of further specimens

for comparison these are assigned to *pedunculatus*, which has already been recorded from Durban. The larger specimen was occupying a land shell, *Metachatina* (*Livinhacia*) *kraussi*, covered with 6 large and 3 small violet anemones (*Calliactis polypus*). The Delagoa Bay specimens were in *Dolium* shells, also with *Calliactis*.

Pagurus asper de Haan

1881. de Man, Notes Leyden Mus., iii, p. 130.
1894. Ortmann, Semon's Austral. Reise, v, p. 31.
1905. Alcock, *l. c.*, p. 90, pl. 9, fig. 5.
1938. Yap-Chiongco, *l. c.*, p. 197, pl. 1, fig. 14.
1943. Thompson, John Murray Exp., vii, p. 416.

Agrees with *pedunculatus* and differs from *deformis* in the same characters as given under *pedunculatus*; differs from the latter in having the limits of the upper and outer surfaces of 6th joint of 3rd left leg undefined by a sharp keel. In other words, the upper surface of this latter joint has 2 keels (inner and outer) in *pedunculatus*, but only the inner one in *asper*.

Locality.—Delagoa Bay (coll. van der Horst).

Distribution.—Maldives, Gulf of Aden, Indian Seas, East Indies to Japan, Australia and Hawaiian Islands.

Remarks.—This species is so very closely allied to *pedunculatus* that it might be regarded merely as a variety.

Gen. Aniculus Dana

1852. Dana, U.S. Expl. Exp., i, p. 460.
1905. Alcock, Cat. Crust. Ind. Mus., ii, pp. 94, 171.

Differs from *Pagurus* as follows: chelipeds equal or nearly so, and similar, fingers and thumbs short, blunt, deeply spooned or hoof-shaped; chelipeds and 2nd and 3rd legs regularly ringed or transversely scutellated, the edges of the scutes finely and closely setose; abdominal appendages in ♀ biramous.

Key to the South African Species.

1. Carapace not depressed, much longer than broad. Eye-stalks shorter than anterior width of carapace. Frontal region, chelipeds and legs remarkably hirsute . . . *aniculus.*
2. Carapace extraordinarily flat, its breadth greater than its length. Eye-stalks equal to anterior width of carapace. Not hirsute . . . . . *strigatus.*

Aniculus aniculus (Fabr.)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 824.
1905. Alcock, *l. c.*, p. 94, pl. 7, fig. 6 (references).
1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 36, pl. 8.
1938. Yap-Chiongco, Philipp. J. Sci., lxvi, p. 201, pl. 2, fig. 2.

As in key. Length of carapace up to 40 mm. Red, chelipeds and legs red and yellow, with broad darker red band on wrist; tips of chelae and dactyls of 2nd and 3rd legs black.

Locality.—Mozambique (Hilgendorf).

Distribution.—East coast of Africa, Mauritius, Indo-Pacific to Japan, Paumotu Archipelago, and New Zealand.

Aniculus strigatus (Herbst)

Fig. 80, *a*.

1878. Hilgendorf, *l. c.*, p. 820, pl. 2, fig. 8 (*Pagurus s.*).
1905. Alcock, *l. c.*, p. 97, pl. 7, fig. 4 (references).
1943. Thompson, John Murray Exp., vii, p. 417.

As in key. Length of carapace up to 14 mm. Carapace whitish; chelipeds and legs deep orange to red, ringed, each ring consisting of the cobalt-blue setae between two dark red lines; eye-stalks deep orange, cornea black; tips of chelae, and dactyls of 2nd and 3rd legs black.

Localities.—Mozambique (Hilgendorf); Delagoa Bay (S. Afr. Mus., coll. van der Horst).

Distribution.—East coast of Africa, Gulf of Aden, South Arabian coast, India to Tahiti.

Remarks.—The strong flattening of the carapace seems to be correlated with the animal's preference for the shells of *Conus* and other shells which have very narrow slit-like openings. The Delagoa Bay specimen is in the shell of *Melongena*, with fairly wide aperture.

Gen. Clibanarius Dana

1910. Stebbing, *l. c.*, p. 352.
1915. Kemp, Mem. Ind. Mus., v, p. 249.
1926. Schmitt, Bull. Amer. Mus. Nat. Hist., liii, p. 49.
1938. Yap-Chiongco, Philipp. J. Sci., lxvi, p. 185.
1939. Melin, *l. c.*, p. 21 (sensu lato).
1940. Chopra and Das, Rec. Ind. Mus., xlii, pp. 145–153.

Rostrum distinct, short. Eye-stalks long and slender, ocular

scales well developed, almost always closely approximate. Chelipeds equal or subequal; fingers opening horizontally; tips of finger and thumb corneous and spooned. Telson lop-sided to the left. A

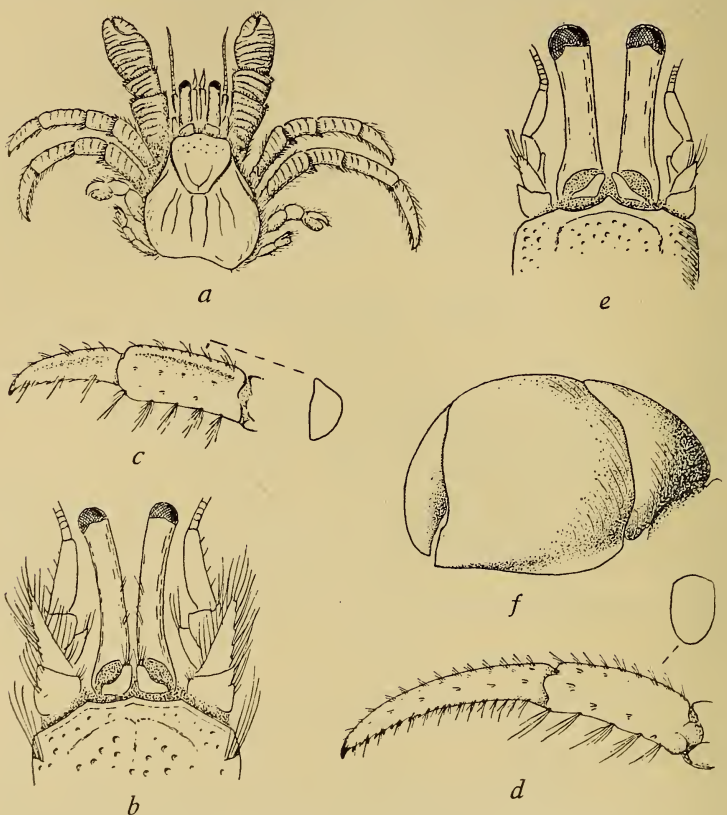


Fig. 80.—*Aniculus strigatus* (Herbst). *a*, carapace, chelipeds, legs.
Clibanarius virescens (Krauss). *b*, front of carapace with eye-stalks and 2nd antennae. *c*, outer view of 6th and 7th joints of 3rd left leg, with cross-section of 6th joint.
Clibanarius padavensis de Man. *d*, outer view of 6th and 7th joints of 3rd left leg, with cross-section of 6th joint.
Calcinus laevimanus (Randall). *e*, front of carapace with eye-stalks and 2nd antennae. *f*, outer view of left chela.

biramous appendage on left side of each of abdominal segments 2–5 in both sexes.

Remarks.—Essentially a shallow-water and littoral genus, often ascending into brackish-water estuaries. The species of the group with long dactyls on the walking legs are mostly found on muddy or soft ground; those with short dactyls in rocky habitats.

Key to the South African Species.

I. Dactyl of 3rd (*i.e.* 2nd walking) leg longer than penultimate joint (fig. 80, *d*).
  A. Eye-stalk much shorter than peduncle of ant. 1 . *clibanarius.*
  B. Eye-stalk as long as peduncle of ant. 1.
    1. Red lines along legs.
      a. Eye-stalk longer than width of carapace. Length of hand of cheliped more than twice its width . . . . *padavensis.*
      b. Eye-stalk equal to width of carapace. Length of hand of cheliped less than twice its width . . . . *striolatus.*
    2. Blue stripes along legs . . . . *longitarsus.*
II. Dactyl of 3rd leg equal to penultimate joint. Sternal plate between 4th legs very wide . . . . *eurysternus.*
III. Dactyl of 3rd leg shorter than penultimate joint, which on the left side has the outer surface flattened and upper margin sharply defined (fig. 80, *c*) . . . . *virescens.*

Clibanarius clibanarius (Herbst)

1843. Krauss, Südafrik. Crust., p. 56.
1910. Stebbing, *l. c.*, p. 352 (*vulgaris*).

Stebbing mentions a small specimen, 50 mm. in length, from Natal. He accepts Krauss' record of this species, whereas Ortmann (1894) and Lenz (1905) consider that Krauss' *clibanarius* is a synonym of *longitarsus* (q.v.). Krauss said it was the largest of the S. African Hermit-crabs!

Distribution.—Indian Ocean, East Indies, Hong Kong. ? West coast of Africa (see Balss, Beitr. Meeresf. Westafr., iii, p. 40, 1921).

Clibanarius padavensis de Man

Fig. 80, *d*.

1888. de Man, J. Linn. Soc. Lond., xxii, p. 242, pl. 16, fig. 1.
1905. Alcock, Cat. Crust. Ind. Mus., ii, p. 44, pl. 4, fig. 2.
1913. McCulloch, Rec. Austral. Mus., ix, p. 349.
1915. Kemp, Mem. Ind. Mus., v, p. 250.
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 120.

Eye-stalks longer than anterior width of carapace, and subequal to peduncle of ant. 1. Cornea smaller than in *striolatus* ($\frac{1}{9}$–$\frac{1}{10}$ length of eye-stalk). Length of hand of cheliped more than twice its width; hand, finger, and thumb with black-tipped conical tubercles on outer surfaces.

Length of carapace up to 32 mm. Carapace uniform yellowish; eye-stalks, peduncles of both antennae, and the legs with narrow longitudinal red lines on a whitish or pale yellowish ground-colour.

Localities.—Delagoa Bay (Barnard).

Distribution.—Coasts of Bay of Bengal to Singapore, East Indies, Australia.

Clibanarius striolatus Dana

1852. Dana, U.S. Expl. Exp., Crust., p. 463, pl. 29, figs. 3, *a–e.*

1905. Alcock, *l. c.*, p. 46, pl. 4, fig. 7.

1913. McCulloch, Rec. Austral. Mus., ix, p. 348.

Eye-stalks equal to anterior width of carapace, cornea larger than in *padavensis.* Width of hand of cheliped more than half the length.

The anterior half of a small specimen (anterior width of carapace 6 mm.), collected together with several *padavensis*, has the eye-stalks equal to anterior width of carapace, and considerably stouter than in *padavensis* (*cf.* Alcock's figure). The hands are not broader than those of similar-sized specimens of *padavensis* with slender eye-stalks. Coloration as in *padavensis.*

Locality.—Delagoa Bay (coll. K. H. B. 1912).

Distribution.—Gulf of Aden, Persian Gulf, Seychelles, eastwards to Fiji and Tahiti, Australia.

Clibanarius longitarsus (de Haan)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 821, and p. 822 (sternal plate).

1894. Ortmann, Semon's Austral. Reise, v, p. 31.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 377.

1915. Kemp, Mem. Ind. Mus., v, p. 250 (*longitarsis*).

1917. Stebbing, Ann. Durban Mus., ii, p. 22.

1942. Chace, Bull. Mus. Comp. Zool. Harv., xci, p. 186.

Very closely allied to *padavensis* (Alcock, *l. c.*, p. 43). Distinguished by the coloration (Henderson, 1915, Rec. Ind. Mus., xi, p. 28).

Locality.—Durban Bay (Stebbing).

Distribution.—Ibo, Zanzibar, Mikindani, Indo-Pacific to Philippine Is. and Japan.

Clibanarius eurysternus Hilg.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 822, pl. 3, figs. 9, 10.

1903. Whitelegge, Rec. Austral. Mus., v, p. 11 (*taeniatus*, non M. Edw., see next reference).

1913. McCulloch, Rec. Austral. Mus., ix, p. 349.

1938. Yap-Chiongco, *l. c.*, p. 189, pl. 1, fig. (not good).

Carapace depressed. Eye-stalks equal to anterior width of carapace, moderately slender. Dactyl of 3rd leg equal to penultimate (6th) joint (Hilgendorf's figure); outer surface of latter joint transversely rugulose. Coxae of 5th legs widely separated; sternal plate between 4th legs greater than anterior width of carapace.

Length of carapace up to 30 mm. Coloration as in *padavensis*, but carapace as well as the legs with longitudinal red stripes.

Locality.—Mozambique (Hilgendorf).

Distribution.—Central Pacific and Torres Strait.

Remarks.—Inhabits shells with narrow apertures.

Clibanarius virescens (Krauss)

Fig. 80, *b*, *c*.

1843. Krauss, Südafrik. Crust., p. 56, pl. 4, figs. 3, *a–c* (*Pagurus v.*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 821, pl. 3, fig. 11 (apex of 5th leg).

1888. de Man, J. Linn. Soc. Lond., xxii, p. 247.

1894. Ortmann, Semon's Austral. Reise, v, p. 31.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 377.

1910. Stebbing, *l. c.*, p. 352.

1913. McCulloch, Rec. Austral. Mus., ix, p. 346, pl. xi, fig. 2.

1917. Stebbing, Ann. Durban Mus., ii, p. 22.

1920. *Id.*, Ann. S. Afr. Mus., xvii, p. 258 (*aequabilis*, non Dana; also specimen with parasites included under *Calcinus laevimanus*).

1924. *Id.*, *ibid.*, xix, p. 5, pl. 2 (Crust., pl. 117) (*Calcinus astathes*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 376.

[? not Osorio, J. Sc. Nat. Lisbon, xi, p. 228. West Africa. See Schmitt, Bull. Amer. Mus. Nat. Hist., liii, 1926, p. 51.]

Front margin of carapace feebly costate; anterior portion of carapace feebly pitted or sometimes strongly rugulose-punctate. Eye-stalks subequal to anterior width of carapace, and to peduncle of ant. 1, but usually slightly (by length of cornea) longer than peduncle of ant. 2. Dactyl of 3rd leg shorter than 6th joint, which latter on the left side has the outer surface flattened, feebly or sometimes strongly rugulose, with sharp (subcarinate) upper edge. Hand of cheliped less than twice as long as wide; hand and fingers with conical tubercles, some of them black-tipped.

Length of carapace up to 20 mm. Carapace anteriorly whitish or greenish, with or without brown or reddish or greenish marks; eye-stalks olive-green with a white ring before the cornea; peduncles of both antennae olive-green; hands and fingers of chelipeds and basal joints of 2nd–4th legs olive-green, brownish or castaneous; 6th joints of 2nd and 3rd legs with white spot on outer surface near apex, and a dark band at apex; dactyls of 2nd and 3rd legs pale yellow or white in the basal and apical thirds; ungues dark; hands of chelipeds with white tubercles, fingers yellowish, tips black. Flagellum of ant. 2 blue. Abdomen blue, greenish, or violaceous. Dactyls of 2nd and 3rd legs sometimes wholly pale, without the dark band in middle.

Localities.—Natal (Krauss); Mozambique (Hilgendorf); East London and Durban (Stebbing); Port Alfred, East London, Durban, St. Lucia Bay, Delagoa Bay (S. Afr. Mus.).

Distribution.—East coast of Africa, Red Sea, East Indies, Hong Kong, Fiji, Australia.

Remarks.—Stebbing's East London specimen is, as he says, quite faded, but agrees in all respects with *virescens*, of which there are other fresher specimens from the same locality in the South African Museum.

I would not have ventured to dispute the identity of Stebbing's *Calcinus astathes* if there had not been four specimens returned to the Museum bearing Stebbing's autographic label (the largest and type specimen probably retained by him, or perhaps now transferred to the British Museum). These four specimens are obviously *virescens*. The dactyl of the 3rd leg is not longer than 6th joint, and has the characteristic shape.

A very common species along the eastern portion of the South African coast, and easily recognized by its olive-greenish colour, and the pale dactyls, usually with dark bands in the middle, of the walking legs.

Gen. Calcinus Dana

1910. Stebbing, *l. c.*, p. 353.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 16.

1924. Stebbing, Ann. S. Afr. Mus., xix, p. 5 (references, but not the species referred to this genus).

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 155.

1938. Yap-Chiongco, Philipp. J. Sci., lxvi, p. 204.

Anterior part of carapace very firmly calcified; rostrum small but distinct. Eye-stalks long and slender; ocular scales slender and close together. Chelipeds unequal, the left vastly the larger; finger

opening in an obliquely-vertical plane, tips of finger and thumb calcareous, strongly spooned. Telson lop-sided to the left. Abdominal appendages on left side on segments 2–5 biramous in both sexes.

Remarks.—Littoral, and mostly Indo-Pacific. The hard parts of the animal usually brightly coloured and variegated.

For the species described under the 1924 reference above, see under *Clibanarius virescens*.

Key to the South African Species.

1. Eye-stalk equal to anterior width of carapace. Upper edge of hand of right cheliped entire. Lower border of 6th and 7th joints of 3rd leg non-setose . . . . *laevimanus.*
2. Eye-stalk much longer than anterior width of carapace. Upper edge of hand of right chela serrate. Lower border of 7th joint and neighbouring part of 6th joint of 3rd leg hirsute (brush-like).
   a. Eye-stalk $1\frac{1}{3}$ times width of carapace. 2nd and 3rd legs with alternate broad bands of blue (white) and dark red. Fingers of both chelae with pearl-like tubercles . . . . . *elegans.*
   b Eye-stalk $1\frac{1}{2}$ times width of carapace. Legs not cross-banded.
      i. Lower border of hand of left chela carinate and serrate . . . . . *latens.*
      ii. Lower border of hand of left chela not carinate . *gaimardii.*

Calcinus laevimanus (Randall)

Fig. 80, *e*, *f*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 823 (*tibicen* M. Edw., non Herbst).

1910. Stebbing, *l. c.*, p. 353.

1912. Balss, D. Tiefsee Exp., xx, p. 93 (*herbstii*).

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 258.

1926. Laurie, *l. c.*, p. 155.

1938. Yap-Chiongco, *l. c.*, p. 205, pl. 2, fig. 5 (not good) (*herbstii*).

1939. Melin, *l. c.*, p. 22, figs. 7, 8 (*herbsti*).

See key. Length of carapace up to 19 mm. Carapace dark brown, greyish, or slaty. Chelipeds dark purplish brown, apices of finger and thumb in right chela white; lower distal corner of hand of the smooth and glabrous left chela and outer distal portion of finger white. 2nd and 3rd legs orange-brown externally, with a median longitudinal dark stripe on 4th and 5th joints; 6th joint uniform

reddish brown, 7th (dactyl) white with a reddish-brown annular band in middle and a dark spot near base on inner and outer surfaces; ungues dark; inner surfaces of 4th and 5th joints greenish orange. Antenna 2 orange; peduncle of antenna 1 cobalt-blue, flagellum orange. External maxillipeds orange or greenish, with flagella of exopods pinkish. Eye-stalks cobalt in basal half, orange distally, cornea blue or black, ocular scales orange or light brown.

Localities.—Natal (Krauss); Ibo and Mozambique (Hilgendorf); Mozambique and Delagoa Bay (Stebbing; and S. Afr. Mus.); St. Lucia Bay, Zululand (S. Afr. Mus.).

Distribution.—East coast of Africa, Indo-Pacific to Hawaiian Islands.

Remarks.—Both de Man and Melin regard the identification with Randall's *laevimanus* 1839 as uncertain, and Melin follows Alcock (1905) in accepting *herbstii* de Man 1887.

Calcinus elegans (M. Edw.)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 823.
1910. Stebbing, *l. c.*, p. 353.
1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 155.
1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 23, pl. 3.
1938. Yap-Chiongco, *l. c.*, p. 206, pl. 2, fig. 10 (not good).
1939. Melin, *l. c.*, p. 21.
1943. Thompson, John Murray Exp., vii, p. 415.

See key. Length of carapace up to 20 mm. Carapace bluish purple, paler anteriorly. Chelipeds dull greenish or purplish, the pearly tubercles on fingers white. 2nd and 3rd legs with alternate broad bands of cobalt-blue and dark purplish maroon, dactyls bluish white with red spots. Ocular scales and bases of eye-stalks red, greater part of eye-stalks cobalt-blue. Antenna 1 blue, antenna 2 orange.

Locality.—Natal (Krauss).

Distribution.—East coast of Africa, Gulf of Aden, Mauritius, Laccadives, to Hawaiian Islands.

Calcinus latens (Randall)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 823.
1905. Alcock, Cat. Crust. Ind. Mus., ii, p. 58, pl. 5, fig. 5.
1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 155.

See key. Dactyls of 2nd and 3rd legs dark purplish brown at bases.

Locality.—Mozambique (Hilgendorf).

Distribution.—Ibo, Red Sea, east coast of Africa to Hawaiian Islands, Australia.

Calcinus gaimardii (M. Edw.)

1848. Milne Edwards, Ann. Sci. Nat. zool. (3), x, p. 63.

1852. Dana, U.S. Expl. Exp. Crust., i, p. 457, pl. 28, fig. 9.

1894. Ortmann, Semon's Austral. Reise, v, p. 32.

1905. Alcock, Cat. Crust. Ind. Mus., ii, p. 56, pl. 5, fig. 3 (references).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 376.

See key. (As preserved) carapace pinkish, red on antero-lateral corners and pterygostomial region. Chelipeds and legs maroon; 6th and 7th joints of 2nd and 3rd legs paler orange, 7th joint whitish apically, ungues black; tips of spines on legs and chelipeds white; tips of fingers and thumbs of chelipeds white (with tufts of black setules). Eye-stalks in basal two-thirds red, distal third puce (? blue in life). Antennae 1 deep orange basally, becoming paler distally, flagellum nearly white. Antenna 2 chrome-yellow.

Locality.—Impengazi, N. of St. Lucia Bay, Zululand (coll. T. A. Stephenson).

Distribution.—Dar-es-Salaam, Maldives, and Indo-Pacific.

Gen. Diogenes Dana

1910. Stebbing, *l. c.*, p. 353.

1927. Gurney, Trans. Zool. Soc. Lond., pt. 2, p. 278 (larval stages).

Rostrum absent, replaced by a movable spiniform process lying between the ocular scales. Eye-stalks moderately slender; ocular scales large, more or less serrate or pectinate on anterior margin. Chelipeds unequal, the left vastly the larger; finger opening in an obliquely-vertical plane, tips of finger and thumb pointed, calcareous. Telson lop-sided to the left. Abdominal appendages on left side on segments 2–5, uniramous in ♂, the first 3 biramous in ♀.

Remarks.—West coasts of Europe and Africa, Mediterranean, Indo-Pacific. Essentially shallow-water species, not descending below about 70 fathoms (Alcock).

The species are difficult to determine, mainly on account of considerable variability (see, *e.g.*, Balss, Beitr. Meeresf. Westafr., iii, 1921, p. 41). The three commoner South African species, however, are easily distinguished from each other, when examined in detail.

Key to the South African Species.

1. Eye-stalks not as long as anterior width of carapace, equal to or shorter than peduncle of ant. 2. Only the right cheliped hirsute.
   - *a*. Upper edge of vertical side-wall of carapace conspicuously serrate throughout nearly its whole length (fig. 81, *e*). 6th joint of 3rd leg slender (fig. 81, *g*) . . . . . *costatus.*
   - *b*. Upper edge of side-wall of carapace with only 2–3 serrations posteriorly, its anterior portion smooth or very minutely serrate (fig. 81, *a*). 6th joint of 3rd leg rather stout (fig. 81, *b*).
     - i. Upper surface of wrist of left chela convex, with irregularly arranged conical tubercles. No red spot on left chela . . . . *brevirostris.*
     - ii. Upper surface of wrist of left chela flat between two conspicuous rows of tubercles. A red spot on outer surface at base of hand of left chela . . . . . *extricatus.*

2. Eye-stalks longer than peduncle of ant. 2. Left cheliped, as well as right, hirsute . . . . . *senex.*

Diogenes pugilator (Roux)

1891. Bouvier, Mem. Soc. zool. Fr., iv, p. 396.
1892. Chevreux and Bouvier, *ibid.*, v, p. 120.
1905. Alcock, Cat. Crust. Ind. Mus., ii, p. 166 (references only).
1921. Balss, Beitr. Kenntn. Meeresf. Westafr., iii, p. 41.
1923. Odhner, Medd. Göteb. Mus., xxxi, p. 8.

Locality.—Port Alexander, Angola, littoral to 72 metres (Odhner).

Distribution.—West coasts of Europe and Africa, Mediterranean, Red Sea, Persian Gulf, Singapore.

Diogenes brevirostris Stmpsn.

Fig. 81, *a–d.*

1843. Krauss, Südafrik. Crust., p. 58 (*miles*, non Fabr.).
1910. Stebbing, *l. c.*, p. 354 (also *miles* Krss., non Fabr.).
1912. Balss, D. Tiefsee Exp., xx, p. 94.
1917. Stebbing, Ann. Durban Mus., ii, p. 21 (*costatus*, non Hend.).
1921. Balss, Beitr. Meeresf. Westafr., iii, p. 43 (as var. of *varians* = *pugilator*, p. 41).
1923. Odhner, Medd. Göteb. Mus., xxxi, pp. 25, 30.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 376.
[Not Henderson, 1888. =*costatus*.]

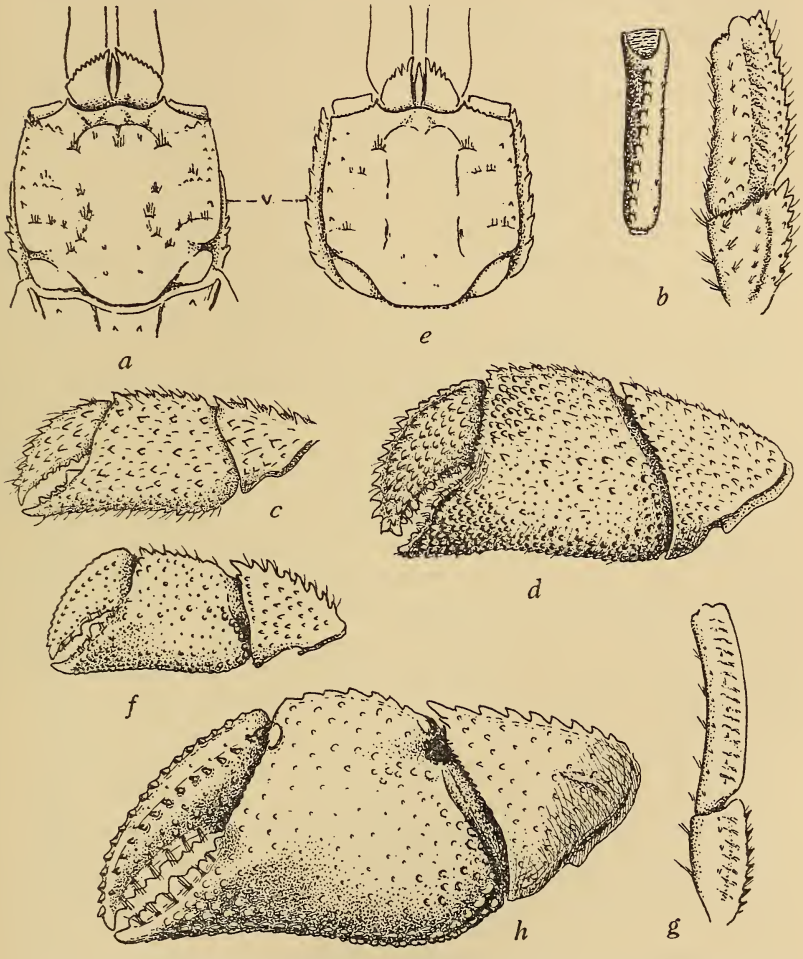


Fig. 81.—*Diogenes brevirostris* Stmpsn. *a*, carapace, with ocular scales and rostral process. *v.*=vertical wall of carapace. *b*, 5th and 6th joints of 3rd left leg, with lower surface of 6th joint. *c*, left chela of specimen of carapace length 3 mm. *d*, the same, length 15 mm.
Diogenes costatus Hend. *e*, carapace. *f*, left chela. *g*, 5th and 6th joints of 3rd left leg.
Diogenes extricatus Stebb. *h*, left chela, showing red spot at base of hand.

Carapace longer than its greatest width, frontal margin shallowly arcuate, the submedian points tipped with a spinule, usually more or less concealed in a tuft of setae, sometimes flanked on outside by

subsidiary denticles, usually a distinct transverse series of 2–4 sharp denticles at each antero-lateral corner; upper edge of vertical side-wall (separated by a deep groove anteriorly from the dorsal shield of carapace) with 2–3 not very conspicuous denticles on its hinder part, the anterior part opposite the antero-lateral corner of carapace and base of ant. 2 quite smooth. Rostral process slender, spiniform, scarcely as long as ocular scales, each of which is as wide as base of eye-stalk, and has from 4–6 (juv.) to 10–12 (ad.) serrations on margin. Eye-stalks shorter than anterior width of carapace, and subequal to peduncle of ant. 2. Acicle of ant. 2 not bifid, extending to end of penultimate joint of peduncle, with 4–5 (juv.) to 6–7 (ad.) teeth on its margin. Left cheliped nearly naked or with short scattered setae, right cheliped with longer and denser yellow hairs. Left cheliped, wrist with 2 rows of conical granules on upper surface, more distinct in young because in adult the upper surface becomes more rounded, and the granules more irregularly placed; outer surface of wrist, hand and finger thickly set (almost imbricate in places) with conical granules and tubercles, palm with fewer tubercles, inner surface of finger with a row of tubercles between two grooves, finger distally strongly convex and serrate in adult. 2nd and 3rd legs with upper margin of 5th joint denticulate (with spiniform granules), of 6th joint with fewer granules, in young almost smooth, dactyl $1\frac{1}{2}$ times the 6th joint, sulcate; in 2nd leg the 6th joint very slightly longer than 5th, in 3rd leg $1\frac{1}{5}$–$1\frac{1}{4}$ times as long; lower margin of 6th joint of 3rd left leg with a series (10–12) of low rounded tubercles (fig. 81, *b*), of 3rd right leg smooth.

Length of carapace up to 15 mm. Flesh-coloured, with pinkish or reddish patches or speckles on carapace anteriorly and on upper surfaces of legs; hand and finger of left cheliped reddish, the larger tubercles (especially distally) often with a whitish or dull bluish tint in relief against the ground-colour when this is extra deep red; 6th and 7th joints of 2nd and 3rd legs often with reddish or brownish longitudinal stripes along the grooves, eyes black (K. H. B.).

Localities.—Natal (Durban) Bay (Krauss); Simon's Bay, 12 fathoms (Stimpson); Gt. Fish Bay, Angola (Balss); St. Francis Bay (Balss); Cape Barracouda and St. Sebastian Bay, 72 metres (Odhner); littoral and shallow water Table Bay, and from False Bay to Durban, also Saldanha Bay on west coast (S. Afr. Mus.).

Remarks.—This is without any doubt the form described by Stimpson, who compared it with *custos*. The smoothness of the upper surfaces of the 6th joints of 2nd and 3rd legs is to a large degree a

juvenile character (Stimpson's specimen had a carapace length of about 7–8 mm.).

Its great abundance and the brown stripes on the legs make it extremely likely that it is also the form which Krauss recorded as *miles*. The latter is a species with a denticulate rostral process, and carapace broader than long, and as yet no species with such characters has been recorded from the South African region.

Balss (1912, 1921) and Odhner (1923) were inclined to regard this as one of the many varietal forms of *pugilator* (Roux) (=*varians* Costa) (distribution, see *supra*). Henderson (1888) thought the same, but he appears to have mistaken the identity of his specimen. Stebbing's 1917 specimens from Durban Bay are almost certainly *brevirostris*, and not *costatus* to which he assigned them.

The species is extremely common, and inhabits all kinds of shells except those with very narrow apertures.

Diogenes costatus Hend.

Fig. 81, *e–g*.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 53, pl. 6, figs. 3, 3, *a* (*brevirostris*, non Stimpson).

1893. *Id.*, Trans. Linn. Soc. Lond., ser. 2, vol. v, p. 418, pl. 39, figs. 7, 8.

1905. Alcock, *l. c.*, p. 70, pl. 6, figs. 7, 7, *a*.

1910. Stebbing, *l. c.*, p. 355.

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 156.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 376.

[Not Stebbing 1917. =*brevirostris*.]

Differs from *brevirostris* as follows: antero-lateral angles of carapace without any denticles, or one, or at most 2 denticles; the submedian points on frontal margin are tipped with a small spine, and often flanked on the outside by some very minute spinules; upper edge of side-wall of carapace with 7 (6–9) sharp denticles extending as far forwards as opposite the base of ant. 2 (fig. 81, *e*); ocular scales with fewer serrations, which are confined to the inner half of margin, each scale scarcely as wide as base of eye-stalk; eye-stalks distinctly shorter than peduncle of ant. 2, extending only half-way along last peduncular joint; acicle of ant. 2 with 3–5 teeth. Left cheliped, wrist with sharper upper margin, bearing larger and more regular denticles; outer surface of hand and finger with finer and consequently more numerous granules, without any tendency to imbrication, the

transverse ridge proximally on lower half of hand much more conspicuous, palm and inner surface of finger also with finer and more numerous granules, profile of finger less strongly convex and serrate. Upper margin of 5th joint of 2nd leg more prominently denticulate, of 6th joint almost smooth (with minute tufts of setules only); upper margin of 5th joint of 3rd leg inconspicuously denticulate, of 6th joint as in the 2nd leg; lower margin of 6th joint of 3rd leg (both left and right) smooth (with minute tufts of setules only). In 2nd and 3rd legs 6th joint more slender than in *brevirostris*, in 2nd leg $1\frac{1}{3}$ times, in 3rd leg $1\frac{1}{2}$ times the length of 5th joint, outer surface without any trace of a longitudinal groove. Dactyls of both legs relatively shorter, $1\frac{1}{4}$–$1\frac{1}{3}$ times the 6th joint.

Length of carapace up to 11 mm. (ovig. ♀ 10 mm.). In Stebbing's dried specimen very faint traces of an annular band in middle of 6th joints of 2nd and 3rd legs.

Localities.—Simon's Bay, 10–12 fathoms (Henderson); off Gt. Fish Point, 30 fathoms (Stebbing); False Bay and Agulhas Bank to Algoa Bay, East London and Natal (S. Afr. Mus.); Delagoa Bay (coll. van der Horst).

Distribution.—East coast of India. ? Seychelles.

Remarks.—Henderson (1888) refers to the "tendency to spinulation" on the left cheliped. His figure, which represents a specimen of 9–10 mm. carapace length, shows a curved lower margin on the hand of left chela, very like the shape found in *extricatus* (*q.v.*), but which does sometimes occur in *costatus* (in the South African Museum series: 4 juv. out of 50 specimens) (and in *brevirostris*); the curvature might easily be exaggerated by an artist according to the angle of view. Henderson's enlarged figure 3, *a*, however, is decisive: he shows the narrow sparingly denticulate ocular scales (also referred to in the text), and the conspicuous serrate edge of the vertical side-wall of carapace.

Balss (1912, *l. c.*, p. 94) was inclined to regard the specimen, identified as *costatus* by Stebbing, as being really *brevirostris*. The differential characters, based on a direct comparison, of these two species have never been given, because Stebbing apparently never saw any *brevirostris*, and Balss no *costatus*.

The two species are undoubtedly distinct, but I am not quite satisfied that the South African form referred to *costatus* is really the same as the Indian form. Henderson's (1893) figure 7 shows faintly a series of denticles along the side of the carapace, but whether they are intended to be on the dorsal shield or on the side-wall is ambiguous; the figure does not correspond with the text as regards the relative

lengths of the eye-stalks and peduncles of ant. 2. Fig. 8 shows the thumb of the chela more strongly deflexed than in any South African specimen.

The Natal specimens (off Umhloti River mouth, 25 fathoms) are all in shells which are completely covered with *Hydractinia*.

Diogenes extricatus Stebb.

Fig. 81, *h*.

? 1893. Henderson, Trans. Linn. Soc. Lond., v, p. 413, footnote ("a large and distinct species from Natal" in Brit. Mus.).

1910. Stebbing, *l. c.*, p. 355.

1912. Balss, D. Tiefsee Exp., xx, p. 94, fig. 3.

Agrees with *brevirostris* as regards the ocular scales (these when fully grown are even wider than the eye-stalks), relative lengths of eye-stalks and peduncles of ant. 2. The proportions of 5th and 6th joints of 2nd and 3rd legs are also nearest to those of *brevirostris* (and more unlike those of *costatus*), being subequal, as measured along upper margin. The 6th joint of 3rd left leg has the upper surface nearly smooth between the inner and outer denticulate margins, a feeble groove along middle of outer surface, and on the lower surface some tufts of setules arising in the axils of very low and rounded, irregularly scattered tubercles (no regular row of tubercles as in *brevirostris*).

Resembles *costatus* in the strongly and regularly dentate upper margin of 5th joint of 2nd and 3rd legs; the 4th joint also is more conspicuously dentate than in either *costatus* or *brevirostris*.

The vertical side-wall of carapace has 2–3 denticles posteriorly (as in *brevirostris*), and some very minute and inconspicuous serrulations extending forwards to opposite antero-lateral corner of carapace.

Characteristic of the present species is the nearly flat upper surface of the wrist of left cheliped, bordered by an inner and an outer row of conical tubercles, the outer row being slightly the stronger; between the two rows there are 4–5 (6) small granules nearer the outer row than the inner row. This double row of tubercles is continued on the upper surface of the hand and the finger, but less conspicuously on the hand. The hand and finger are more like those of *costatus* than those of *brevirostris* in shape; there is no prominent ridge or row of granules proximally on lower half of hand, and both hand and finger are studded with fewer and smaller granules than in *brevirostris*.

Length of carapace up to 20 mm. Pale flesh-colour, brighter on

wrist and hand of larger cheliped, a characteristic red spot on outer surface at base of hand of larger cheliped (fig. 81, *h*), a reddish longitudinal stripe on outer surface of 6th joint of legs, cornea black, ova salmon-red (K. H. B.).

Localities.—Mossel Bay (Stebbing, and S. Afr. Mus.); Algoa Bay (Balss); False Bay (S. Afr. Mus.).

Remarks.—Besides Stebbing's specimen, there are in the South African Museum five other specimens from 10 to 13 mm. carapace length, including an ovigerous ♀ of 13 mm. In the three largest the lower margin of hand of left chela is almost straight from the proximal convexity; that is to say, the thumb is not at all deflexed as it is in Stebbing's specimen (here figured); when viewed from above and slightly obliquely the hand has the shape shown in Henderson's figure (1888) of his "*brevirostris.*"

Diogenes senex Heller

1865. Heller, Reise "Novara," Crust., p. 85, pl. 7, figs. 3, 3, *a*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 824.

1882. Haswell, Cat. Austral. Crust., p. 158.

1905. Alcock, *l. c.*, p. 166 (references only).

Rostral process spiniform. Ocular scales broad, apex with 2–3 spinules. Eye-stalks longer than peduncle of ant. 2. Acicle not bifid, with 2–3 long teeth. Left cheliped as well as the right hirsute. Wrist of left cheliped with 6 teeth on upper margin; outer surface of hand with a rough longitudinal ridge. (After Hilgendorf and Haswell.)

Length of carapace 12 mm.

Localities.—Inhambane (Hilgendorf); Durban (Univ. Cape Town Ecol. Surv., 1946).

Distribution.—Red Sea, Singapore, New South Wales.

Gen. Cancellus M. Edw.

1924. Stebbing, Ann. S. Afr. Mus., xix, p. 6.

1927. Hale, Crust. S. Austral., pt. 1, p. 94.

1941. *Id.*, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 277.

Body squat and broad, the abdomen symmetrical or nearly so, not coiled (typically). Rostrum not prominent. Eye-stalks long, ocular scales well separated. Flagellum of ant. 2 short. Chelipeds equal, more or less modified, and together with the 2nd pair (or 2nd and 3rd pairs) of legs forming an operculum closing the burrow (or shell) in which the animal lives; hand of chelipeds triquetral, bent

downwards at the wrist. In ♂ no abdominal appendages (except the uropods); in ♀ appendages on left side only on segments 2–5. Uropods and telson symmetrical or nearly so.

Remarks.—The above diagnosis covers the typical species of the genus. As pointed out below, the single South African species departs from it in several structural features, as well as in its choice of a home.

Normally these Hermit-crabs live in burrows, which they are said to excavate themselves, in corals, soft rocks, and sponges; the mouth of the burrow being completely closed by the chelae and apical joints of the anterior legs (see Hale, fig. 92).

Cancellus makrothrix Stebb.

Fig. 82.

1924. Stebbing, *l. c.*, p. 6, pl. 3 (Crust., pl. 118).

Most parts of the body and appendages strongly hirsute. Rostrum broad and very short, but acute and distinct. Frontal margin rather strongly costate, the costa interrupted at the shallow notch between rostrum and the very obtuse submedian points. Behind the costa a transverse crescentic groove, and a short medio-longitudinal groove. Eye-stalks equal to anterior width of carapace (*i.e.* between the very obtuse antero-lateral angles), and extending slightly beyond apex of extended peduncle of ant. 1 (by about length of cornea), slender, dilated at base, but swelling only very slightly distally, setose. Ocular scales L-shaped, apically acute, closely approximate or contiguous. Apex of peduncle of ant. 2 reaching half-way along eye-stalk, acicle reaching nearly to end of last joint of peduncle, acute, 2 spinous tubercles on outer margin, and one on inner margin, with numerous bristly hairs; flagellum about as long as length of anterior (calcified) part of carapace, its joints with whorls of short setules. Chelipeds and 2nd and 3rd legs thickly covered on their anterior surfaces with stiff bristly hairs arranged in tufts, and on the hands of the chelipeds more or less in longitudinal lines. Inner upper margin of hands and fingers with a few blunt (mostly dark-tipped) tubercles, and on the inner surface of the fingers below the upper margin two additional rows of tubercles (4–5 in each row). Inner upper margin of 5th joint of 2nd leg with 7–8 denticles, of 6th joint more or less scalloped owing to the insertion of bristle-tufts. 6th and 7th joints of 2nd and 3rd legs subequal. Biramous appendages in ♀ on left side of abdominal segments 2–5 (in the single ♂ specimen the abdomen is missing). Left uropod slightly longer than right; 6th abdominal segment calcified,

transversely divided by a deep groove, granulose and setose, its distal margin overhanging base of telson, margin denticulate, a broad quadrangular lobe projecting slightly beyond the postero-lateral corners. Telson about as broad as long, or slightly longer than broad,

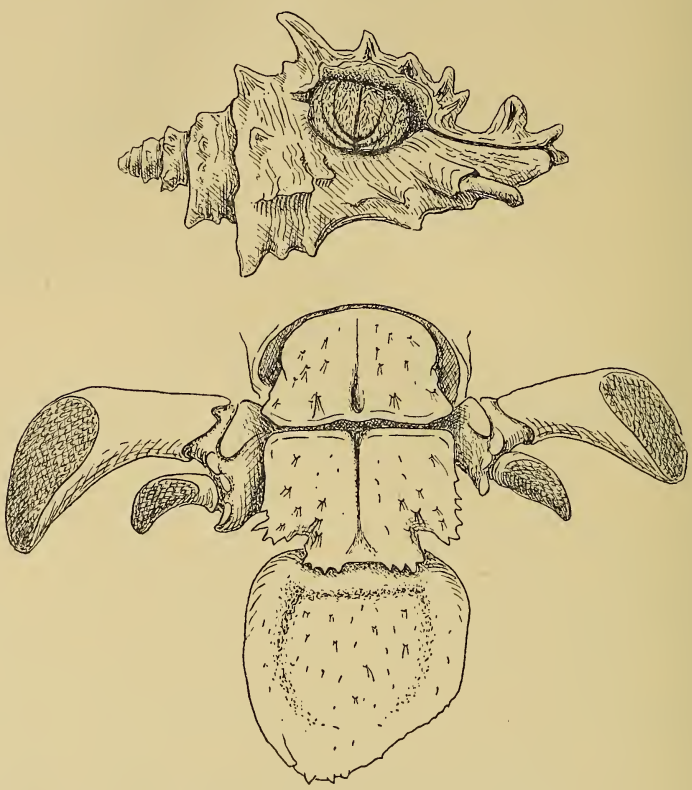


Fig. 82.—*Cancellus makrothrix* Stebb. Crab in *Murex* shell, showing chelipeds and anterior two pairs of walking legs closing the aperture, ⅔ natural size. Fifth and sixth abdominal segments, uropods and telson, enlarged, setae on uropods and telson omitted.

asymmetrically subcircular, a semicircular shallow groove and a few granules and setules on upper surface, margin strongly setose, and (in one specimen) with a few calcified denticles.

Length of carapace up to 27 mm., greatest width 25 mm. (in all 3 specimens the width is slightly less than median length, not greater as given by Stebbing for his type).

Localities.—Algoa Bay, 10 fathoms (Stebbing); off East London and off Cape Morgan, 17 fathoms (S. Afr. Mus.).

Remarks.—Beyond the remarkable hirsuteness, it is difficult to extract any specific characters from Stebbing's description and figures. Fortunately there is another specimen from the same locality as the type, and also two other specimens in the South African Museum, from which the above description has been compiled.

This species is a very aberrant one, if it is to be regarded as a *Cancellus*. Both the 2nd *and also the 3rd* pairs of legs participate with the chelipeds in closing the aperture of the mollusc shell, and in conformity with this unusual habitat the abdomen is spirally coiled to an extent equal to that of any other shell-inhabiting Hermit-crab. The uropods, however, remain nearly symmetrical. The upper distal corner of the wrists of the chelipeds does not project so strongly (knuckle-like) as in more typical species, and the anterior surface of the hand, though flat, is scarcely concave. The carapace is widened posteriorly. The ocular scales are closely approximate, in fact contiguous.

The East London and Cape Morgan specimens are both housed in *Murex* shells, which would appear to be extraordinarily heavy for the crabs to drag about; the aperture of the shell, however, is exactly closed by the chelipeds and two pairs of walking legs.

Development.—Attached or adhering to various parts of the abdomen and sides of the carapace of the Cape Morgan specimen were 8 juveniles, 2 still enclosed in the egg membrane, the other 6 free.

Those curled up in the egg membrane form an oval mass measuring 3 mm. × 2–2·5 mm. When removed from the membrane and straightened out the crab has a carapace length of about 2 mm., and a total length of about 5 mm. The eye-stalks are stout, not more than $2\frac{1}{2}$ times as long as wide. The carapace, abdomen, chelipeds, and legs appear to be glabrous, but the rasp-like pads on 4th and 5th legs are developed. The abdomen is symmetrical, with 4 pairs of simple appendages on segments 2–5; the uropods are equal, but the telson is slightly asymmetrically bilobed.

The 6 free specimens are miniatures of the adult, except that the abdomen is symmetrical, with 4 pairs of appendages. They can thus be said to be still in the *Glaucothoë* stage. The length of the carapace is 2·5 mm., total length 5·5–6 mm. The chelipeds and 2nd and 3rd legs are covered with bristly hairs, the rest of the body with plumose setae. Hands of chelipeds bent downwards at the wrists. Tips of fingers and thumbs, and ungues of 2nd and 3rd legs corneous, brown. 6th abdominal segment medio-longitudinally grooved, posterior

margin denticulate; uropods subequal, setose; telson slightly asymmetrically bilobed, margin setose.

It is thus certain that in this species the free-swimming *Zoeä* stage is suppressed, the larva developing up to the *Glaucothoë* stage within the house occupied by the mother.

Gen. Parapagurus S. I. Smith

1910. Stebbing, *l. c.*, p. 356.

1912. Balss, D. Tiefsee Exp., xx, p. 96.

1939. Melin, *l. c.*, p. 20 (sensu lato).

Rostral point short or obsolescent. Eye-stalks moderate, ocular scales spiniform, moderately or widely separated. Chelipeds unequal, the right vastly larger than the left, finger moving in an obliquely vertical plane, tips of finger and thumb calcareous (or with minute corneous granular tip). 2nd and 3rd legs long, especially the dactyls. Telson lop-sided to the left. Abdominal appendages: in ♂ a pair of uniramous appendages on segments 1 and 2, and a biramous (one ramus almost rudimentary) one on the left side only on segments 3–5; in ♀ a biramous appendage on left side only on segments 2–5. Vas deferens not protruding. Genital opening of ♀ present on left side only.

Key to the South African Species.

1. Chelipeds densely pubescent, not sexually dimorphic. Last peduncular joint of ant. 1 elongate, more than half the anterior width of carapace . . . . . *pilosimanus.*
2. Chelipeds sparsely setose, sexually dimorphic. Last peduncular joint of ant. 1 not more than half anterior width of carapace . . . . . *dimorphus.*

Parapagurus pilosimanus S. I. Smith

Fig. 83, *a*, *b*.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 87, pl. 9, figs. 2, 2, *a* (*abyssorum*).

1894. Milne Edwards and Bouvier, Res. Sci. Camp. Monaco, fasc. vii, p. 64, pl. 9, figs. 1–17.

1905. Alcock, Cat. Crust. Ind. Mus., ii, p. 99, pl. 10, fig. 1 (references).

1910. Stebbing, *l. c.*, p. 357, pl. 17 (Crust., pl. 43) (*bouvieri*).

1912. Balss, *l. c.*, p. 96, pl. xi, figs. 1–6.

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 160.

1943. Thompson, John Murray Exp., vii, p. 417.

Anterior width of carapace slightly greater than median length from rostral point to cervical groove. Cornea slightly dilated, but not wider than base of eye-stalk; the latter $\frac{3}{5}$–$\frac{2}{3}$ the anterior width of carapace. Last peduncular joint of ant. 1 $\frac{2}{3}$–$\frac{3}{4}$ the anterior width of carapace, and as long as peduncle of ant. 2. Acicle of ant. 2 extending

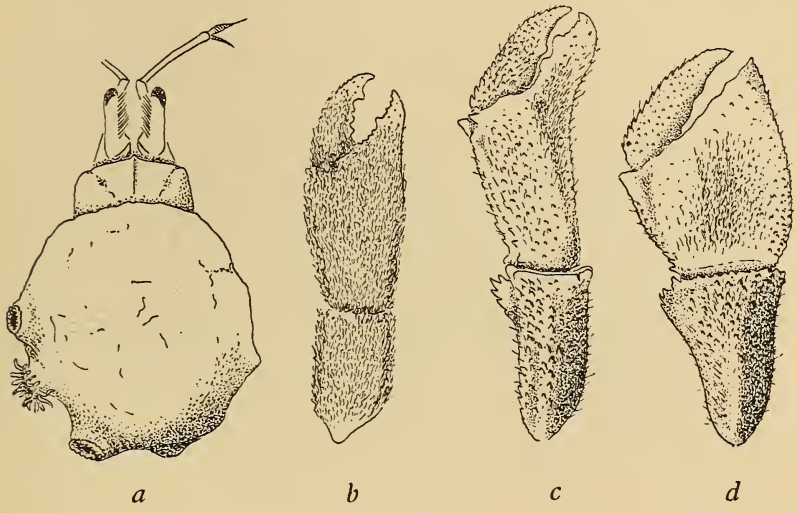


Fig. 83.—*Parapagurus pilosimanus* S. I. Smith. *a*, anterior part of carapace projecting from colony of *Epizoanthus*, with eye-stalks and antenna 1. *b*, right chela.
Parapagurus dimorphus (Studer). *c*, right chela ♂. *d*, right chela ♀ (more strongly magnified than that of ♂).

to or slightly beyond apex of last peduncular joint. Chelipeds, especially the right, densely pubescent, not sexually dimorphic.

Length of carapace up to 25 mm., right cheliped ♂ 70 mm., ♀ 55 mm. Body pinkish, basal joints of chelipeds with reddish patches, 2nd and 3rd legs red, with a conspicuous white band along the upper and lower margins, cornea dark crimson, antenna 1 pink with white band along upper margin of last peduncular joint, antenna 2 pink (K. H. B.).

Localities.—Off East London, 300 fathoms (Stebbing); Agulhas Bank, 500 metres (Balss); off Table Bay and Cape Point, southern edge of Agulhas Bank, and off East London, 130–400 fathoms (S. Afr. Mus.).

Distribution.—Atlantic from Nova Scotia to Tristan d'Acunha;

Indian Ocean; Pacific from Japan and California to southern Patagonia. 250–2260 fathoms.

Remarks.—Stebbing's species *bouvieri* was based on small specimens. Apparently the only difference from the typical form (and the species is known to be very variable), as shown in Henderson's and Alcock's figures, is the slightly greater length of the eye-stalks. The dilatation of the cornea is an ambiguous character, as the cornea often appears slightly dilated unless viewed in a true dorsal view. *P. bouvieri* can be regarded as at most a variety of *pilosimanus*.

The 1st abdominal appendage in adult ♂ is broader and more triangular than shown in Stebbing's figure; it resembles that of *dimorphus*.

Lives in shells covered with the coenosarc of *Epizoanthus* colonies. Most of the specimens would appear to have been unable to withdraw completely into their protective "houses"; this is especially noticeable in young specimens where the abdomen only is encased and protected.

A ♀ specimen in the S. African Museum (carapace length 15 mm.) has a cluster of flask-shaped bodies, 13–14 on each side, attached to the bases of the maxillipeds, chelipeds, and walking legs. These bodies are attached by a narrow base, are 6–7 mm. in length, and are parasitic Copepods.

Parapagurus dimorphus (Studer)

Fig. 83, *c*, *d*.

1910. Stebbing, *l. c.*, p. 356.

1912. Balss, *l. c.*, p. 97.

Anterior width of carapace equal to median length to cervical groove. Cornea dilated, wider than base of eye-stalk; the latter equal to half anterior width of carapace. Last peduncular joint of antenna 1 not exceeding half anterior width of carapace, and shorter than peduncle of antenna 2. Acicle of antenna 2 barely reaching apex of last peduncular joint. Chelipeds with short scattered setae not concealing the tubercles and granules; sexually dimorphic, the hand of right chela in ♂ adult being trapezoidal, with finger oblique, in ♀ obovate, with finger almost at right angles to long axis of hand; upper distal margin of wrist of right cheliped on inside (both sexes) strongly carinate and prominent (not so prominent in juv., with carapace length less than 7–8 mm.); a prominent knob at end of upper margin of hand of right chela (both sexes) overhanging articulation of finger.

Length of carapace up to 25 mm., of right cheliped ♂ 70 mm., ♀ 50 mm.

Coloration similar to that of *pilosimanus*.

Localities.—34° 13′ S., 15° W., 117 fathoms (Studer); Agulhas Bank 150 fathoms (Henderson); off Cape Point (Stebbing); off Table Bay, Cape Point, Agulhas Bank, 178–500 metres (Balss); off Saldanha Bay, Table Bay and Cape Point, 80–250 fathoms (S. Afr. Mus.).

Distribution.—Tristan d'Acunha, Marion Island, and Patagonia.

Remarks.—In various shells, either without sea-anemones, or with single anemones, but most frequently in shells completely covered with the coenosarc of *Epizoanthus* colonies. This species seems to be able to withdraw itself into its house far better than *pilosimanus*.

Glaucothoë stage (probably *dimorphus*). Frontal margin convex, but not triangularly produced. Chelipeds unsculptured and nearly glabrous, the right much larger than left, with some feeble crenulations on inner distal margin of wrist. 2nd and 3rd legs with dactyls longer than 6th joints, setose, without spinous projections on lower margin. Peduncle of uropod without spinous projection. Telson as long as basal width, triangular, with the apex rather broadly rounded, and the lateral margins slightly indented.

Carapace length 3·5 mm., total length 10–11 mm.

Locality.—Off Cape Point, 120 fathoms, 4th May 1900, 3 specimens (S. Afr. Mus.).

Gen. Pylopagurus M. Edw. & Bouv.

1891. Milne Edwards and Bouvier, Bull. Soc. Philom. Paris, ser. 8, iii, p. 108.

1893. *Id.*, Mem. Mus. Comp. Zool. Harv., xiv, p. 74.

1895. Faxon, *ibid.*, xviii, p. 61.

1910. Stebbing, *l. c.*, p. 359.

Rostral point not prominent. Eye-stalks moderate; ocular scales simple, separated. Chelipeds unequal, the right vastly larger than the left; in both the hand bent downwards and incapable of being straightened, hand of right cheliped flattened on outer surface and forming an operculum; finger moving in a horizontal plane (see remarks); tips of finger and thumb corneous (except that of thumb of left chela). Telson lop-sided to the left. Abdominal appendages: in ♂ unequally biramous appendages on left side only on segments 3–5; in ♀ a pair of uniramous appendages on segment 1, biramous appendages on left side only on segment 5. Vas deferens not protruding.

Remarks.—Differs from *Eupagurus* in having a pair of appendages on abdominal segment 1 in ♀. The vertical movement of the fingers of the chelae is also given as a differential character, but in the few specimens I have seen the fingers certainly move horizontally; the figures of other species also give the impression of a horizontal movement, and some of the species were at first described as species of *Eupagurus.*

Key to the South African Species.

1. Outer surface of hand of right chela granulate . . . *ungulatus.*
2. Outer surface of hand of right chela pitted . . . *liochele.*

Pylopagurus ungulatus (Studer)

1910. Stebbing, *l. c.*, p. 359.

1912. Balss, D. Tiefsee Exp., xx, p. 106, footnote.

1921. *Id.*, Beitr. Kenntn. Meeresf. Westafr., iii, p. 46 ("*Nylopagurus*"; typ. err.).

Peduncle of ant. 2 extending to cornea (Studer; but according to his figure he would seem to have reckoned the elongate 5th joint as part of the flagellum). Right cheliped: 4th joint (according to figures) with 5 rounded tubercles on upper margin; upper surface of wrist with inner and outer margins serrate, and with some conical tubercles on both upper and (according to figure) lateral surfaces; hand broadly oval, upper surface with smooth granules, outer and inner margins connected across the base of hand, costate and serrulate, finger with serrulate outer margin. Hand of left cheliped (according to figure) with smooth margins and a few granules on upper surface. Upper margins of 5th–7th joints of 2nd and 3rd legs carinate and serrulate, and (according to figure) glabrous. Text and figure in conflict as to relative lengths of 6th and 7th joints of 2nd and 3rd legs. Movable finger of 5th leg curved, much longer than thumb (text and figure, but probably the long setae on apex have been matted together and misinterpreted as the finger).

Length of carapace about 6 mm.

Locality.—Off Table Bay, 50 fathoms, in shell of *Fusus* overgrown with *Eschara* (Studer). The type has "the paired abdominal appendages which are characteristic of the genus" (Balss, 1912).

Distribution.—Lagos, W. Africa (Balss). Recorded (♂ ♀) from the Caribbean Sea, 20 fathoms, but differing in several features from Studer's description; these differences, however, may be due to the conflict between Studer's text and figures (M. Edwards and Bouvier).

Pylopagurus liochele Brnrd.

Fig. 84.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 376.

Carapace as broad as long (to cervical groove), rostral point not prominent, with a tuft of setules on apex. Eye-stalks about $\frac{2}{3}$ width of carapace, base and cornea slightly dilated, ocular scales acute. Peduncle of ant. 1 slightly longer than eye-stalk (by about half the length of its last joint). Peduncle of ant. 2 very slightly longer than

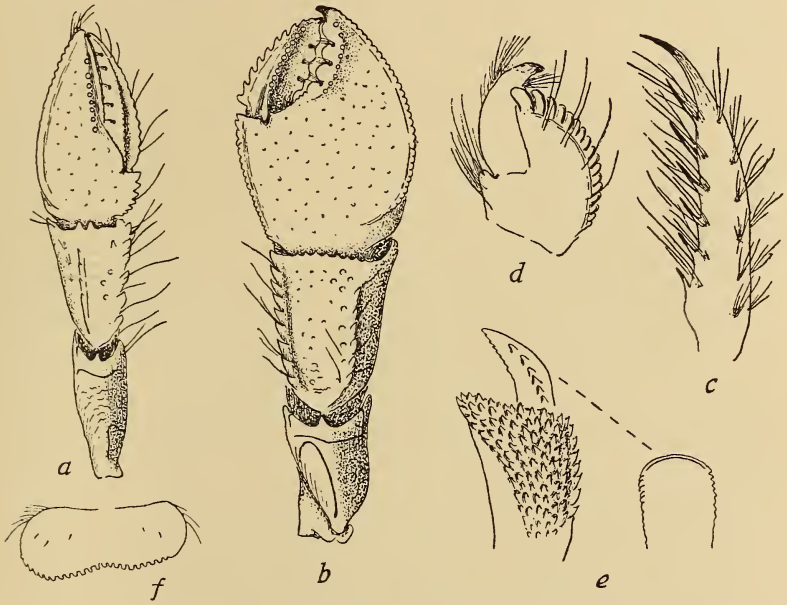


Fig. 84.—*Pylopagurus liochele* Brnrd. *a*, *b*, left and right chelipeds (drawn as if straightened out). *c*, dactyl of left 3rd leg. *d*, 6th and 7th joints of 4th leg, surface setae omitted. *e*, 6th and 7th joints of 5th leg, setae omitted, with inner view of 7th joint (dactyl). *f*, telson.

peduncle of ant. 1, eye-stalk reaching to about middle of last peduncular joint; acicle reaching to about basal third of last joint of peduncle of ant. 1, with strong bristles on inner margin and apex. Right cheliped: 4th joint quite smooth, a denticle at distal end of upper margin; wrist with inner and outer margins of upper surface serrate, the inner stronger than the outer, upper distal margin denticulate, a very few low granules on upper surface; hand ovate, upper surface quite smooth, with numerous shallow pits, inner and outer margins costate and crenulate (about 20 crenulations on inner margin)

but not connected across base of hand, lower surface with scattered tufts of setae, an inconspicuous row of low pearly granules bordering the cutting-edge of thumb, which bears 4 large blunt teeth distally and 3 small ones proximally; finger with serrulate margin, a strong ridge bearing a row of pearly granules on upper surface, tips of finger and thumb conspicuously corneous. Left cheliped similar to right but more slender, with more numerous bristles on wrist, the hand ovate-lanceolate, the finger without ridge or granules in middle of upper surface, cutting-edge of thumb and proximal half of finger crenulate, in distal half of finger forming a sharp ridge; tip of finger, but not of thumb, corneous. 2nd and 3rd legs strongly setose, dactyl (including the rather long unguis) equal in length to 6th joint, with 5–6 stiff corneous spines on lower margin in both 2nd legs and in left 3rd leg, and 8 in right 3rd leg. 6th joint of 4th leg with a single row of very stout, slightly imbricate, blunt spines, finger and unguis stout (fig. 84, *d*). 6th joint of 5th leg with patch of spiniform granules, the apical thumb-like process very short and broadly spooned, finger strongly spooned, with corneous margin (fig. 84, *e*). Abdomen in ♂ asymmetrical, dried and badly shrunken so that only one appendage in middle of left side can be traced; in ♀ missing. Telson much broader than long, distal margin slightly emarginate, minutely denticulate. Left uropod much larger than right.

Length of carapace ♂ 12 mm., ♀ 5 mm.; left cheliped (base of 4th joint to apex of thumb) ♂ 22 mm., ♀ 7 mm.; right cheliped ♂ 26 mm., ♀ 9 mm.

Localities.—Off Cape Seal, 37 fathoms, mud, 1 ♂ in a sponge (the original Gastropod shell having been completely covered up and absorbed); Algoa Bay, 10 fathoms, sand, shell, stones, 1 ♀ without abdomen, shell not preserved (S. Afr. Mus.).

Remarks.—This species is distinguished from all others by the pitted surface of the right chela; in other species the outer surface of the hand is granulate or tuberculate, each tubercle being mushroom-shaped. The right hand in *liochele* is further noticeable in that the costate inner and outer margins are not continuous across the base of the hand (cf. *affinis* Faxon, and *hirtimanus* Faxon). In having only a single row of spines ("rasp") on the 6th joint of the 4th leg this species resembles *discoidalis* (M. Edw.), *rosaceus* M. Edw. & Bouv., and *hirtimanus* Faxon.

Incertae sedis

The following species, represented by four specimens, is placed here between *Pylopagurus* and *Eupagurus* for the following reasons :—

The specimens might perhaps have been identified with *ungulatus* if Balss (1912) had not stated that Studer's type had the paired abdominal appendages characteristic of *Pylopagurus*. The present ♀ specimen has no paired appendages on segment 1.

Eupagurus is the only other possible genus, but here again is a conflict. The present specimens have 3 unequally biramous appendages on left side in ♂, 4 appendages on left side in ♀. They do not therefore fit into *Eupagurus* (♂ as well as ♀ with 4 appendages) or *Pagurillus* Melin, which has 3 *uniramous* appendages in ♂.

Rostral point not prominent. Eye-stalks $\frac{2}{3}$ width of carapace, base and cornea slightly enlarged, ocular scales acute. Peduncles of ant. 1 and ant. 2, and acicle of latter as in *P. liochele*. Right and left chelipeds as in *liochele* except right hand is considerably more narrowly ovate, $1\frac{1}{2}$–$1\frac{2}{3}$ times as long as broad, with its upper surface granulate; as in *liochele* the costate and crenulate inner and outer margins not connected across base of hand. Legs as in *liochele*; rasp on 4th leg uniseriate. Abdominal appendages: 3 biramous in ♂ on 2nd, 3rd, and 5th segments on left side, one ramus about $\frac{1}{3}$ the length of the other on the foremost appendage, but scarcely $\frac{1}{4}$ on the hindmost appendage; in ♀ 4 appendages on left side, the hindmost one uniramous, the other 3 biramous. Telson apically notched and denticulate; left uropod much larger than the right.

Length of carapace ♂ 9 mm., ♀ 5 mm.; right cheliped (base of 2nd joint to apex) ♂ 15 mm., ♀ 8·5 mm. Colour (taken from the Port Elizabeth specimen in formalin, and the Simonstown one collected alive by myself): eye-stalks sienna at base, distal half cobalt, with narrow dark sienna ring immediately next the black cornea; 4th joint of right and left chelipeds with a cobalt band bordered with sienna, and distal margin dark sienna; granules on upper surface of hands white on a pale sienna ground, sienna longitudinal stripes on thumb and finger; basal half of 4th joint of 2nd and 3rd legs sienna, distal half pale, longitudunal sienna stripes on 5th and 7th joints and on upper basal half of 6th joint, distal half of 6th joint yellowish, passing into cobalt apically.

Localities.—False Bay, 1 ♂ in the sponge *Suberites*, and Simonstown, littoral, 1 ♂ (S. Afr. Mus.); Jeffreys Bay, littoral, 1 ♂, and Port Elizabeth, littoral, 1 ovig. ♀ (Professor T. A. Stephenson, 1936).

Remarks.—Until more collecting of the smaller littoral and shallow-water Hermit-crabs has been carried out along the South African coast, I think it best to leave this species without a name. When alive it ought to be easily identifiable by the cobalt bands on the

chelipeds, and by the sculpturing of the hands of the chelipeds in preserved material.

Gen. Eupagurus Brandt

1910. Stebbing, *l. c.*, p. 356.

1912. Balss, D. Tiefsee Exp., xx, p. 106.

1924. Stebbing, Ann. S. Afr. Mus., xix, p. 7.

1939. Melin, K. Sv. Vet. Ak. Handl., xviii, no. 2, pp. 20, 29 (sensu lato).

Rostrum distinct or obsolescent. Eye-stalks stout or slender, ocular scales separate, simple, acute. Chelipeds unequal, the right vastly the larger (very rarely subequal, but not in any South African species), fingers opening in a more or less horizontal plane, tips of fingers and thumbs calcareous or minutely corneous. Telson lop-sided to the left. Abdominal appendages unequally biramous, on left side only on segments 2–5 in both sexes. Vas deferens not protruding.

Remarks.—The largest of all the genera of Hermit-crabs; shallow to moderately deep water; cosmopolitan. Formerly thought (Alcock, 1905) to be absent from the African coast except the Mediterranean and northwest coast as far as Senegal, but species have since been recorded from as far south as Gt. Fish Bay on the west coast, and from the Agulhas Bank, Natal, and Somaliland. Between Gt. Fish Bay and Cape Point, however, none have as yet been reported.

A few small specimens, collected at Simonstown, Hermanus, Jeffreys Bay and Algoa Bay, have been submitted to me by Professor T. A. Stephenson, but the material is not good enough for a thorough examination.

Three species recorded by Odhner (1923) from Port Alexander are omitted from the key owing to lack of material and literature.

Key to the South African Species.

I. Eye-stalks equal to or greater than anterior width of carapace. Legs striped . . . . . *zebra.*

II. Eye-stalks less than anterior width of carapace.

A. Cornea not dilated. Hands of the two chelipeds fitting together to form an operculum. Hand and finger of right chela bluntly oval. Dactyls of 2nd and 3rd legs subequal to the 6th joints . . . *alcocki.*

B. Cornea dilated. Hands of the two chelipeds not fitting together. Hand of right chela oblong, twice as long as wide. Dactyls of 2nd and 3rd legs longer than the 6th joints.

1.	Eye-stalks stout, scarcely exceeding half anterior width of carapace, and not extending to end of peduncle of ant. 2. Cornea strongly dilated.	
	a. Rasp * of 4th leg multiseriate . . .	*spinulentus.*
	b. Rasp of 4th leg uniseriate . . .	*deprofundis.*
2.	Eye-stalks slender, about $\frac{3}{4}$ anterior width of carapace, extending to end of peduncle of ant. 2. Cornea moderately dilated. Finger of left chela curved, a gap between it and thumb	*placens.*

Eupagurus zebra Hend.

1912. Balss, *l. c.*, p. 106.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 259.

Rostral point acute. Eye-stalks slender, as long as (or slightly longer than) anterior width of carapace, cornea very little dilated. Hand of right cheliped increasing in width distally, but greatest width less than its length, lower border subcarinate, beaded, outer surface more or less granulate, inner surface (according to Alcock) with a strong diagonal ridge, finger very broad at base, free edge carinate; cutting-edge of both finger and thumb without strong teeth. Left cheliped very slender.

In a variety (from the Andaman Is.) the whole outer surface of wrist and hand of right cheliped is finely granular; upper surface of wrist and hand of left cheliped with granules and spinules tending to form longitudinal series.

Length of carapace 8 mm. (Alcock); 21 mm. (Stebbing). Yellowish, with blood-red stripes on 2nd and 3rd legs and left cheliped, inner and upper surfaces of 4th joint and upper surface of wrist of right cheliped, upper surface of peduncle of antenna 2, and on sides of carapace anteriorly.

Localities.—Agulhas Bank, 102 metres (Balss); off East London, 32 fathoms (Stebbing).

Distribution.—N.W. Australia, Ceylon, Andaman Is., Persian Gulf.

Remarks.—Balss referred a single ♂ specimen (size not given) to the Andaman variety, remarking that no red stripes were visible.

Stebbing considered the South African specimens might prove specifically different from *zebra* (he suggested the name *parazebra*), but beyond pointing out that Alcock's description did not agree in one

* The tuberculate pad on 6th joint used as a hold-fast.

respect with Henderson's, and that there was a conflict between Alcock's text and figure, he did not say how the South African specimens differed from the typical form except in size. The specimens returned to the South African Museum with Stebbing's autographic label do not belong even to the genus *Eupagurus*, so that a re-examination is impossible. The real specimens may be in the British Museum.

Eupagurus alcocki Balss

1911. Balss, Zool. Anz., xxxviii, p. 6.

1912. *Id.*, *l. c.*, p. 108, pl. 8, fig. 4, pl. 9, fig. 3, and text-figs. 17–21 (*pollicaris* var. *alcocki*).

1923. Odhner, Medd. Göteb. Mus., xxi, p. 12, fig. (right cheliped).

Rostral point obtuse. Eye-stalks shorter than anterior width of carapace, cornea not dilated. Outer surfaces of wrist and hand of both chelipeds granulate, but the inner surfaces smooth, flattened and fitting closely together; hand and finger of right chela bluntly oval in outline, forming an operculum, the free edge of the broadly subtriangular finger coarsely denticulate. 2nd and 3rd legs thinly setose, dactyls subequal to the 6th joints.

Length of carapace up to 10 mm.

Locality.—Gt. Fish Bay, Angola (Balss); Port Alexander, Angola, 72–108 metres (Odhner).

Distribution.—Congo River mouth, 44 metres (Balss).

Remarks.—Odhner supports Balss' original opinion that *alcocki* should be given specific rank, and details the points of difference between it and *pollicaris* (Say). The latter is found on the east coast of N. America.

Eupagurus spinulentus Hend.

Fig. 85, *a–d.*

1910. Stebbing, *l. c.*, p. 356 (*tristanensis*, non Henderson).

1920. *Id.*, Ann. S. Afr. Mus., xvii, p. 260.

Frontal margin of carapace evenly curved, without median rostral point. Eye-stalks stout, scarcely exceeding half the anterior width of carapace, cornea strongly dilated. Chelipeds with granules and spiniform conical tubercles. Right cheliped: distal width of 4th joint $1\frac{1}{3}$ times its length, which is equal to length of hand to finger-hinge,

and also to distal width of wrist, the latter with a more or less double row of strong tubercles down the middle and a row of stronger ones on inner margin, hand oblong, twice as long as wide, outer and inner margins spinose-tuberculose, at base a short continuation of the middle ridge of wrist, finger and thumb with robust but unequal teeth. Left cheliped similar, distal width of 4th joint $1\frac{1}{2}$ times its length, which is about $\frac{2}{3}$ total length of hand, the middle and inner ridges on wrist more strongly spinose-tuberculose, and the middle ridge on hand more marked, cutting-edges of finger and thumb corneous, continuous on finger, but on thumb interrupted at nearly equal intervals by little upstanding conical denticles. 2nd and 3rd legs granulate and spinose-tuberculose, dactyls longer than the 6th joints (nearly equal to 5th plus 6th), slender, evenly tapering, outer margin finely serrulate, lower margin sparsely setose. Rasp of 4th leg multiseriate. Telson longer than broad, postero-lateral margin spinose on either side of a slight median emargination.

Length of carapace up to 14 mm.

Localities.—Natal coast, 27–92 fathoms (Stebbing); Mossel Bay and Natal coast, 27–36 fathoms (not north of Tugela River mouth) (S. Afr. Mus.).

Remarks.—At the time Stebbing identified a small specimen (carapace 4·3 mm., left chela 6·3 mm.) from the Natal coast with the Tristan d'Acunha species *tristanensis* he had not seen the larger specimens, also from the Natal coast. On comparing the specimens I find that the former is merely a juvenile of the latter.

For identifying the South African form with the Philippine *spinulentus* there seems to be considerable justification. The presence of the two spines on upper distal margin of 4th joint of left cheliped may be mentioned as an additional reason. But the granules on outer surface of hand are much smaller and much more numerous, without any tendency to alignment, except near the base, where some larger ones are aggregated on a low short ridge; nor is there a naked groove near the inner margin. A direct comparison with the type would probably show that the South African form is worthy of specific rank.

All the shells which have been preserved with the crabs (*Melapium*, *Natica*, *Tonna*) have a single sea-anemone surrounding the aperture; the crown of the sea-anemone is situated over the inner lip or columella of the shell, so that when the crab is walking about, the sea-anemone would be underneath, with the crab's maxillipeds immediately above it. Some of the shells are covered above with *Balanus amphitrite* Darwin.

Eupagurus placens Stebb.

Fig. 85, *e*.

? 1923. Odhner, Medd. Göteb. Mus., xxxi, p. 25 (? *cuanensis*, non Thompson, the St. Sebastian Bay specimens).

1924. Stebbing, *l. c.*, p. 7, pl. 4 (Crust, pl. 119).

Rostral point minutely tridentate. Eye-stalks moderately slender, about $\frac{3}{4}$ width of carapace, and extending very nearly to end of peduncle of ant. 2, cornea moderately dilated. Chelipeds with thick shaggy filamentous setae on hand and wrist, especially the former, more or less concealing the spiniform conical tubercles, and the junction of finger and thumb. Right cheliped: 4th joint with a small denticle in middle of distal upper margin, wrist as long as hand as far as finger-hinge, its distal width $\frac{4}{5}$ its length, inner margin with 6 strong spine-tubercles, a more or less distinct row in middle of upper surface, and a few scattered ones, outer margin not defined, hand oblong, about twice as long as wide, strong spine-tubercles along inner and outer margins, especially strong on outer margin of thumb, a row in middle of upper surface, and a few smaller scattered ones; lower surface of hand and wrist smooth, sparsely setose, finger equal to inner margin of hand, free edge serrate, a submarginal row of conical tubercles. Left cheliped similar but more slender, hand slightly more than twice as long as wide, no denticle on 4th joint, finger twice as long as inner margin of hand, without serrations and tubercles, curved, cutting-edges of finger and thumb not meeting, that of finger as in *spinulentus*, that of thumb with a series of close-set conical denticles; tips of fingers and thumbs of both chelipeds minutely corneous. 2nd and 3rd legs rather thickly covered with shaggy setae, especially on distal joints, dactyls longer than 6th joints, upper margin of 5th joint of 2nd leg (right and left) with 5–6 slender spines, lower margin of dactyls smooth. Rasp of 4th leg multiseriate. Telson broader than long, postero-lateral margin spinose on either side of a slight median emargination.

Length of carapace up to 16 mm., left cheliped 20 mm., right 30 mm.

Localities.—Mossel Bay, 19 fathoms (Stebbing); False Bay, 32 fathoms, and off Cape St. Blaize, 55 fathoms (S. Afr. Mus.); Knysna channel (Univ. Cape Town Ecol. Surv., 1947).

Remarks.—Although the type of *placens* was not returned by Stebbing, two other specimens are available, one of them from off Cape St. Blaize, near the type locality. Both of these had previously

been compared by myself with the specimen sent to Stebbing, registered as conspecific, and retained in case of loss in transit of the specimen sent overseas.

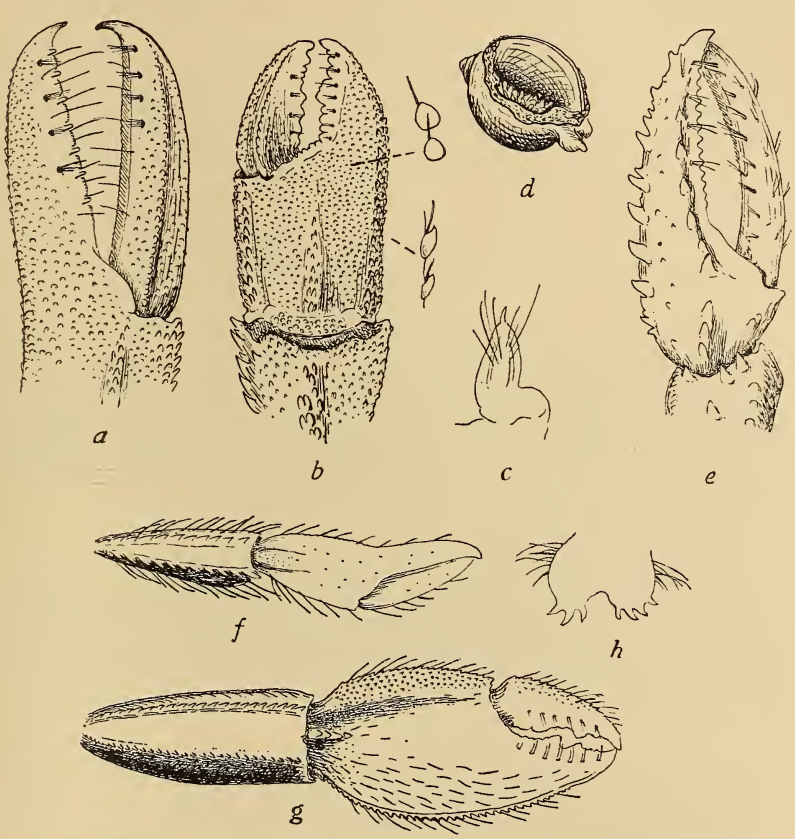


FIG. 85.—*Eupagurus spinulentus* Hend. *a*, *b*, apices of left and right chelae, with setiferous denticles on latter further enlarged, and in side view. *c*, right ocular scale. *d*, shell (*Melapium*) with sea-anemone encircling aperture, crab removed.
Eupagurus placens Stebb. *e*, hand of left chela, shaggy setae omitted.
Anapagurus hendersoni Brnrd. *f*, *g*, wrists and hands of left and right chelae. *h*, telson.

Stebbing's figure shows the eye-stalks as too robust, and in the 4th leg the rasp seems to have been omitted so that the leg appears simple (as in *Paguristes*) instead of subchelate. Whether the rasp was multiseriate was not stated, but in his description of the following species (*deprofundis*) Stebbing said that the 4th legs were alike in the

two species, and his figure of that of the latter seems to show a uniseriate rasp. The type, if extant (? in British Museum), should be re-examined. A figure of the left chela denuded of its shaggy covering is given here to show the characteristic gap between finger and thumb.

The "house" of the Cape St. Blaize specimen is a compound Ascidian, in shape like a conical cap. The wide, open aperture measures about 30 mm. in width, 20 mm. in height, and the depth of the cap is about 13–14 mm. The crab seems to have lived sideways in this cap, leaving the cheliped and legs of the left side more or less exposed.

I am inclined to suspect that Odhner's specimens from St. Sebastian Bay should be assigned to this species and not to *cuanensis*.

Eupagurus deprofundis Stebb.

1924. Stebbing, *l. c.*, p. 9, pl. 5 (Crust., pl. 120).

According to the figures: rostral point entire, subacute; eye-stalks rather short, robust, reaching not more than half-way along last peduncular joint of ant. 2, cornea strongly dilated; right cheliped similar to that of *placens*; rasp of 4th leg uniseriate.

Length of carapace 14 mm.

Locality.—Off Cape Morgan, 250–320 fathoms (Stebbing).

Remarks.—The type and only specimen of this species was not returned to the South African Museum, and I am unable to add anything to Stebbing's description and figures. The specimen may perhaps be in the British Museum.

Eupagurus variabilis M. Edw. & Bouv.

1892. Milne Edwards and Bouvier, Ann. Sci. Nat. (7), xiii, p. 217.
1899. *Id.*, Res. Sci. Camp. Monaco, fasc. xiii, p. 67.
1900. *Id.*, Crust. Trav. and Talisman, p. 230, pl. 26, figs. 4–12.
1922. Bouvier, Res. Sci. Camp. Monaco, fasc. lxii, p. 33.
1923. Odhner, Medd. Göteb. Mus., xxxi, p. 10.

Locality.—Port Alexander, Angola, 72–108 metres (Odhner).

Distribution.—Norway to Senegal, Mediterranean.

Eupagurus triangularis Chevr. & Bouv.

1892. Chevreux and Bouvier, Mem. Soc. zool. Fr., v, p. 93, pl. 2, figs. 9–15.
1900. Milne Edwards and Bouvier, Crust. Trav. and Talisman, p. 239.

1923. Odhner, *l. c.*, p. 12.

Locality.—Port Alexander, Angola, 12–15 metres (Odhner).

Distribution.—Senegal and Cape Verde Islands.

Eupagurus cuanensis (Thompson)

1843. Thompson, Rep. Brit. Assoc. Adv. Sci., p. 267 (sine descr.).

1853. Bell, Stalk-eyed Crust. Brit., p. 178, fig.

1886. Henderson, Proc. Roy. Phys. Soc. Edin., ix, p. 72.

1900. Milne Edwards and Bouvier, Crust. Trav. and Talisman, p. 227, pl. 28, figs. 19, 20.

1922. Bouvier, Res. Sci. Camp. Monaco, fasc. lxii, p. 32.

1923. Odhner, *l. c.*, p. 10, and ? p. 25.

Localities.—Port Alexander, Angola, 72 metres (Odhner); St. Sebastian Bay, 72 metres (Odhner).

Distribution.—Norway to Canaries, Mediterranean.

Remarks.—As mentioned above, I rather suspect that the St. Sebastian Bay specimens should be identified as *placens*.

Gen. Anapagurus Hend.

1910. Stebbing, *l. c.*, p. 358.

Differs from *Eupagurus* in that the left vas deferens protrudes as a curved membranous organ from the base of 5th leg.

Remarks.—As pointed out below, the ♀ of the South African species is distinguishable at once from the species of *Eupagurus* by its specific characters.

Anapagurus hendersoni Brnrd.

Fig. 85, *f–h*.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 74 (Cape specimen referred with doubt to *pusillus*).

1910. Stebbing, *l. c.*, p. 358 (*pusillus*, non Henderson).

1912. Balss, D. Tiefsee Exp., xx, p. 110 (*pusillus*, non Henderson).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 377.

Frontal margin of carapace evenly curved, without median rostral point. Eye-stalks short, rather robust, about half anterior width of carapace, extending nearly to apex of peduncle of ant. 2, cornea strongly dilated. Chelipeds finely and evenly setose, the hand less so than the wrist; outer and inner lower margins of 4th joint, and outer and inner upper margins of wrist each with a row of numerous close-set

spiniform tubercles. Right cheliped: wrist twice as long as wide, its length extending to half-way along thumb, upper surface of hand smooth except for a band of fine granules along inner margin, a very short tubercular ridge in middle at base, and a costate-serrulate outer margin, nearly glabrous; finger minutely serrulate on free margin, upper surface convex but scarcely carinate; lower surface of wrist and hand finely granulate and setose laterally. Left cheliped very slender, wrist $2\frac{1}{2}$ times as long as wide, its length extending half-way along thumb, hand almost entirely smooth and glabrous, a very feeble and minutely serrulate outer margin proximally, and a few minute granules on the slight middle ridge basally, thumb slightly deflexed, cutting-edges of finger and thumb meeting, that of finger as in *E. spinulentus*, that of thumb very feebly crenulate. 2nd and 3rd legs moderately setose, upper margins of 4th and 5th joints with very feeble serrations, caused by the insertions of tufts of setules, dactyls very slender, longer than 6th joints, and slightly longer on right than on left side, upper margins setose, lower margins smooth. Rasp of 4th leg uniseriate, the spines apically acute. Telson about as broad as long, rather deeply incised, 3–4 large spinous projections on each lobe.

Length of carapace up to 7 mm., left cheliped 14 mm., right 16–17 mm. Carapace anteriorly pale pinkish, 4th joints of chelipeds and legs with pale brownish transverse markings, 6th joints of legs violaceous, eyes black, ova scarlet (K. H. B.).

Localities.—Simon's Bay, 18 fathoms (Henderson); St. Francis Bay (Balss); Table Bay, False Bay, Algoa Bay, 10 fathoms, off East London, 45 and 400 fathoms, off Umhloti River mouth, Natal, 100 fathoms, and off Cape Natal, 54 fathoms (S. Afr. Mus.).

Remarks.—Henderson referred a Cape specimen with some hesitation to his *pusillus* from the Azores and Canaries, pointing out certain differences. In addition to these differences, the present specimens show others which Henderson apparently overlooked. The 4th joint of the right cheliped has many more spines on its outer lower margin (*pusillus* 3, *hendersoni* 10–15), the wrist of right cheliped is longer relatively to the hand. The eye-stalk in *pusillus* is said to extend to the end of the penultimate peduncular joints of both antennae, but Henderson's figure is in conflict with this statement as regards antenna 2. (In his figure of the left cheliped, the finger and thumb are transposed; ? mirror-picture due to printing.)

In both sexes this species is at once distinguished from all the South African species of *Eupagurus* by the slender left cheliped, with its long

biserially spinose wrist, and by the hand of the right cheliped. The projecting vas deferens on the left side extends to about the middle of the 4th joint of the 5th leg, and is almost as wide as this joint. Distally the convex margin is cultrate, and the apex is acute. In one specimen several oval spermatophores are visible through the integument, but the actual orifice cannot be traced. An external prolongation of the vas deferens is said * to transfer the spermatophores to the penis proper (modified 1st pair of pleopods), but where such is not present, as in the present genus, the vas deferens is probably applied direct, if not inserted into, the female orifice on the 3rd legs.

Ortmann (1891–92, Zool. Jahrb. Abt. Syst., vi, p. 296, pl. 12, fig. 11) has described *pusillus* var. *japonicus*. I have not seen the paper.

Gen. Nematopagurus M. Edw. & Bouv.

1905. Alcock, Cat. Crust. Ind. Mus., ii, pp. 108, 174.

Anterior margin of carapace without median rostral point. Eye-stalks stout, ocular scales small, separate. Chelipeds nearly alike in form, sculpture, and length, but the right more bulky than left; finger moving horizontally, tips of fingers and thumbs corneous. Telson lop-sided to the left. Abdominal appendages: on left side on segments 3–5 in ♂, in ♀ a pair of modified appendages on 1st segment, and appendages on left side on segments 2–5. Vas deferens protruding on left side as a short conical tube or papilla, on right side as a long tube ending in a long filament.

Nematopagurus longicornis M. Edw. & Bouv.

1892. Milne Edwards and Bouvier, Ann. Sci. Nat. (7), xiii, p. 210.
1899. *Id.*, Res. Sci. Camp. Monaco, fasc. xiii, p. 60.
1900. *Id.*, Crust. Trav. and Talisman, p. 201, pl. 24, figs. 10–16.
1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 26.
1923. Odhner, Medd. Göteb. Mus., xxxi, p. 9.

Locality.—Port Alexander, Angola, 72 metres (Odhner).

Distribution.—Spain to the Azores and Cape Verdes, Mediterranean, 75–800 metres.

Gen. Catapaguroides M. Edw. & Bouv.

1905. Alcock, *l. c.*, p. 185.
1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 26.

* Balss in Kükenthal, Handb. Zool., iii, 1926–27, p. 903.

Similar to *Nematopagurus*, but the right vas deferens sabre-shaped and curving under the abdomen from right to left; and ♀ without appendages on 1st abdominal segment.

Catapaguroides timidus (Roux)

1900. Milne Edwards and Bouvier, *l. c.*

1905. Alcock, *l. c.*, p. 184 (*Eupagurus t.*) (references only).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 9 (variety).

Odhner's variety lacks the tooth-like process on lower outer surface of wrist of right cheliped.

Locality.—Port Alexander, Angola, 72 metres (Odhner).

Distribution.—Eastern Atlantic, Mediterranean, Canaries.

Family COENOBITIDAE.

1910. Stebbing, *l. c.*, p. 359.

Like *Paguridae*, but the peduncle of 1st antenna is very long, and both its flagella end bluntly.

Remarks.—This family contains the genera *Birgus* (the Robber-crab) and *Coenobita*. These Hermit-crabs are terrestrial, but resort to the sea for spawning. The eggs hatch as normal Zoeas (with rounded postero-lateral angles of carapace.)

Gen. Coenobita Latr.

1901. Borradaile, F. Geogr. Mald. Laccad. Archip., i, p. 69 (structure and habits.)

1904. Seurat, Bull. Mus. Hist. Nat. Paris, no. 5, p. 238 (habits).

1910. Stebbing, *l. c.*, p. 359.

1938. Yap-Chiongco, Philipp. J. Sci., lxvi, p. 209.

Carapace well calcified, elongate, anteriorly compressed from side to side. Rostrum obsolete. Eye-stalks more or less compressed, ocular scales close together. Peduncle of antenna 1 very long, larger flagellum compressed, with blunt apex. Peduncle of antenna 2 compressed, acicle small, often fused with 2nd joint, flagellum elongate. Left cheliped much more robust than right, fingers moving vertically. 4th leg subchelate, the 6th joint very broad, finger minute. Basal joints of 5th leg (with genital openings in ♂) more or less produced, sometimes unequally, and more so in ♂ than in ♀. Abdominal appendages on left side on segments 2–4 in ♀, rudimentary in ♂.

Key to the South African Species.

Ocular scales narrow, acuminate. Antennal acicle fused with 2nd joint. A brush of hairs on inner upper surface of hand of *both* chelae.

1. A stridulating rasp on upper outer surface of hand of left chela . . . . . *rugosus.*
2. No stridulating organ on hand . . . . . *cavipes.*

Coenobita rugosus M. Edw.

Fig. 86.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 824.

1910. Stebbing, *l. c.*, p. 360.

1912. Balss, D. Tiefsee Exp., xx, p. 111.

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 162 (also p. 163, *perlatus*).

1938. Yap-Chiongco, *l. c.*, p. 210, pl. 2, fig. 7 (not good), and p. 211, pl. 2, fig. 3 (not good) (*perlata*).

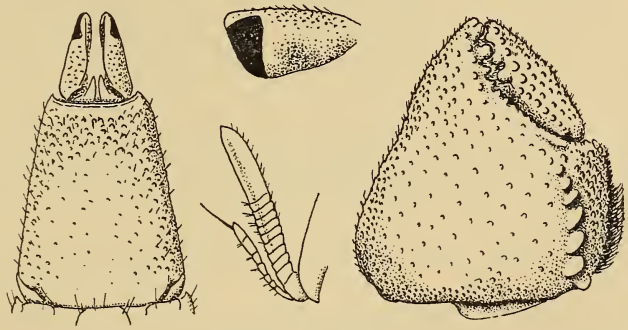


Fig. 86.—*Coenobita rugosus* M. Edw. Anterior part of carapace, with eyes; outer side view of eye; flagella of 1st antenna; left chela, showing stridulating tubercles.

Eye-stalks compressed, reaching beyond middle of last peduncular joint of ant. 2. On upper part of outer surface of hand of left chela a series of oblique laminar tubercles forming a stridulating organ. A strong longitudinal ridge on middle of inner surface of hand of left chela below the brush of hairs. Outer surface of 6th joint and dactyl of 3rd left leg flattened and separated from the upper surface by a distinct ridge or crest. On lower inner surface of dactyl of 2nd and 3rd left legs a longitudinal ridge of close-set and regular tubercles,

which can be rubbed against the rasp on hand of chela. Basal joints of 5th leg produced, more so in ♂ than in ♀, and in ♂ more so on right than on left side.

Length of carapace up to 30 mm. Pale creamy or pinkish, usually a dark brownish or reddish patch on outside of hand of left chela.

Localities.—Natal (Krauss); Ibo and Mozambique (Hilgendorf); Scottburgh, Natal (coll. K. H. B.); Delagoa Bay (coll. van der Horst).

Distribution.—East coast of Africa, Red Sea, Indo-Pacific to west coast of America.

Coenobita cavipes Stimpson

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 825 (*violascens* Heller).

1912. Balss, D. Tiefsee Exp., xx, p. 112.

1917. Stebbing, Ann. Durban Mus., ii, p. 24.

1938. Yap-Chiongco, *l. c.*, p. 212, pl. 1, fig. 12 (not good).

Eye-stalks compressed, not reaching middle of last peduncular joint of ant. 2. No stridulating tubercles on hand of left chela; but lower inner surface of dactyl of 2nd and 3rd left legs with a fine ridge, whose edge is corneous. Outer surface of 6th joint of 3rd left leg nearly flat, but not separated from upper surface by a crest except quite at its distal end. Basal joints of 5th leg slightly more prominently produced in ♂ than in ♀, and in both sexes more so on the left than on the right side.

Length of carapace up to 39 mm. Coloration as in *rugosus*.

Localities.—Mozambique (Hilgendorf); Durban (Stebbing); Kosi Bay (Univ. Cape Town. Ecol. Surv., 1949); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—East coast of Africa to East Indies and Liu Kiu Islands.

GALATHEIDEA.

1910. Stebbing, *l. c.*, p. 360.

1924. Gurney, "Terra Nova" Rep. zool., viii, p. 174 (larval stages).

Carapace more or less depressed, regions well- or ill-defined. Eye-stalks short and stout. First 4 pairs of legs well developed; the 1st pair (chelipeds) stout and flattened or elongate and slender; the 5th pair slender, feeble, and bent up against carapace. Abdomen symmetrical, folded under thorax (crab-like) or folded on itself and not closely adpressed to thorax. Uropods and telson forming a tail-fan. Pleopod 2 in ♂ well developed, but pleopod 1 either well developed, or rudimentary, or absent.

Key to the Families.

1. Front without prominent acute rostrum (figs. 87–90). Abdomen folded under thorax, crab-like. Ant. 1 concealed. Peduncle of ant. 2 directed backwards. 3rd joint of 3rd mxp. broad (fig. 90, *c*) . . . . *Porcellanidae.*
2. Front with a prominent acute rostrum (except *Hapaloptyx*) (figs. 91, *i*, 92). Abdomen folded upon itself, not adpressed to thorax. Ant. 1 exposed. Peduncle of ant. 2 directed forwards. 3rd joint of 3rd mxp. narrow (fig. 91, *j*).
   - *a*. Telson not folded beneath preceding abdominal segment. Cutting-edge of mandible entire . . *Galatheidae.*
   - *b*. Telson transversely fissured, and folded beneath preceding abdominal segment. Cutting-edge of mandible serrate (except *Hapaloptyx*) . . . *Uroptychidae.*

Family PORCELLANIDAE.

Porcelain Crabs.

1910. Stebbing, *l. c.*, p. 360.

1924. Gurney, *l. c.*, p. 176 (larval stages).

1927. Hale, Crust. S. Austral., pt. i, p. 81.

Carapace with ill-defined regions, frontal margin more or less triangularly produced but never with acute rostrum. Abdomen symmetrical, bent under and closely adpressed to thorax. Tail-fan large. 1st antennae concealed. Peduncle of ant. 2 directed backwards. Chelipeds usually large, especially in ♂, more or less flattened. Mxp. 3 large, 3rd joint broad, 4th with internal lobe, distal joints with conspicuous fringe of long plumose setae, used in sweeping food into the mouth.

Remarks.—Although crab-like in appearance, the small posterior (5th) pair of legs at once distinguishes the Porcelain Crabs from the true Crabs. The external (3rd) maxillipeds with their long fringe of setae are also characteristic.

The enlarged 1st peduncular joint of 1st antennae appears to provide useful specific characters. But the 1st pleopods exhibit little or no specific difference (*cf.* Miyake, Annot. Zool. Jap., xvi, 1937).

Key to the South African Genera.

I. A portion of hinder part of epimeral region (side-wall) of carapace separated from the rest by a membranous suture (fig. 87, *b*). Wrist of chelipeds short and broad. *Pachycheles.*

II. No portion of the epimeral region separated by a membranous suture.
  A. Walking legs ending in a single claw (fig. 87, *e*).
    1. 1st joint of ant. 2 produced (fig. 88, *c*, *g*). Frontal margin dentate . . . . *Porcellana.*
    2. 1st joint of ant. 2 very short, not produced (fig. 89, *c*, *g*). Frontal margin triangularly produced, undulate but not dentate . . *Petrolisthes.*
  B. Walking legs ending in two claws (fig. 90, *d*).
    1. Carapace transversely ovoid . . . . *Polyonyx.*
    2. Carapace longer than broad . . . . *Porcellanella.*

See Addenda.

Gen. Pachycheles Stimpson

1894. Ortmann, Semon's Austral. Reise, v, p. 28 (key to species).
1910. Stebbing, *l. c.*, p. 361.
1939. Melin, K. Sv. Vet. Ak. Handl., xviii, no. 2, p. 114.

Frontal margin not very prominent, broadly triangular, subacute, not dentate. 1st joint of ant. 2 enlarged, excluding the following (movable) joints from the orbit, but not produced forwards. Chelipeds thick and robust, wrist very short and broad. Legs ending in a single claw. A squarish portion of the hinder part of the epimeral region of carapace separated from the rest by a membranous suture.

Pachycheles natalensis (Krauss)

Fig. 87.

1843. Krauss, Südafrik. Crust., p. 58, pl. 4, fig. 1, *a–c* (*Porcellana n.*).
1910. Stebbing, *l. c.*, p. 362.

Carapace a little broader than long. Frontal margin obtusely triangular; lateral margins entire, with 4–5 costae in hinder part. 4th joint of cheliped with one short blunt tooth, wrist about as broad as long, inner margin with 3 blunt teeth; hand granulate, with 2 feeble, granulate, longitudinal ridges. 1st joint of ant. 1 triquetral in cross-section, ventral surface flat. Lower front margin of basal joint of ant. 2 entire.

Length of carapace 6 mm., breadth 7 mm. "Mottled greenish blue and reddish" (Krauss); mottled salmon-pink, chelipeds reddish, or creamy-white with crimson chelipeds.

Localities.—Natal (Krauss); Umhlali (N. of Durban) and Impengazi (N. of St. Lucia Bay) (coll. T. A. Stephenson); St. Lucia Bay, Zululand (S. Afr. Mus.).

Remarks.—Since Krauss' time no one had collected this species in Natal until Professor Stephenson's survey party in 1938. Paulson recorded it from the Red Sea. Ortmann (1894) collected a ♀ at Dar-es-Salaam which he said agreed with Krauss' description, and also with *sculptus* M. Edw. If identical with the latter, the distribution extends to the East Indies, Liu Kiu Islands, and Australia. Without material for comparison I am unable to express any opinion on the

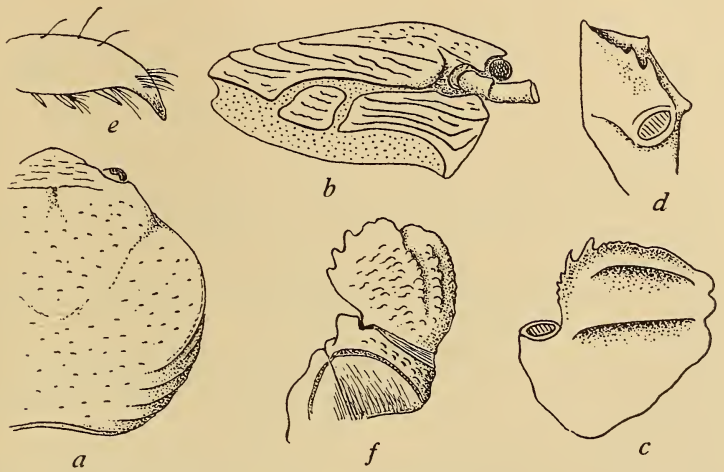


Fig. 87.—*Pachycheles natalensis* (Krauss). *a*, carapace. *b*, side view of carapace showing membranous areas (lightly dotted). *c*, ventral view of 1st joint of left 1st antenna. *d*, side view (from median line) of same. *e*, dactyl of walking leg. *f*, 3rd–5th joints of smaller cheliped.

identity or otherwise of this species with *sculptus*. Melin (1939) describes a closely allied species, *fronto*, from the Bonin Is.

Gen. Porcellana Lam.

1910. Stebbing, *l. c.*, p. 361.

Frontal margin prominent, dentate. 1st joint of ant. 1 enlarged, thick, triquetral in cross-section, its apex more or less truncate, and variously ornamented. 1st joint of ant. 2 enlarged and produced forwards, forming the lower border of orbit. Chelipeds moderately flattened, 4th joint rather short, often with a projecting lobe on inner margin at base; the two chelipeds usually unequal in size in ♂; finger and thumb often contorted. Legs ending in a single claw.

Key to the South African Species.

1. Median tooth of frontal margin broadly triangular, its length half its basal width. Basal joint of ant. 2 serrate. Lobe of 4th joint of cheliped squarely truncate . . *streptocheles.*
2. Median tooth of frontal margin narrower, its length subequal to its basal width. Basal joint of ant. 2 entire. Lobe of 4th joint of cheliped rounded . . . . *dehaanii.*

Porcellana streptocheles Stimpson

Cape Porcelain Crab.

Fig. 88, *a–d.*

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 243.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 110.

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 28 (False Bay: *dehaanii*, non Krauss).

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 191, pl. 23, fig. 1.

1910. Stebbing, *l. c.*, p. 361 (False Bay: *dehaanii*, non Krauss).

1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 162 (*dehaanii*, non Krauss).

1913. Balss, Schultze Reise, v, p. 109 (*dehaanii*, non Krauss).

1914. Strunck in Lenz and Strunck, D. Südpol. Exp., xv, p. 286 (*dehaanii*, non Krauss).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 25 (*dehaanii*, non Krauss).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 377.

Median frontal tooth broadly triangular, half as long as its basal width, when viewed obliquely from behind appearing almost tridentate owing to the apex being somewhat abruptly depressed; margin of median tooth and outer margin of lateral teeth minutely crenulate or denticulate, more so in ♀ and juv. than in ♂; margin of carapace above peduncle of ant. 2 entire in ♂, but sometimes with indications of 2 feeble denticles, in ♀ with 2 denticles; lateral margin with 4 (or 5) small denticles, the hindmost but one slightly larger than the others. Surface of carapace with very shallow grooves, and very feebly rugulose-scabrous; 2 conspicuous tufts of setae on gastric region, and usually a tuft at apex of the groove on median frontal tooth; otherwise smooth in ♂, but in ♀ and juv. with a few tufts and scattered setae on the other regions. 1st peduncular joint of ant. 1

with a few not very prominent denticles. Basal peduncular joint of ant. 2 with about 4 rather strong denticles. Inner (front) margin of 3rd joint of chelipeds more or less crenulate; inner apex of 4th joint produced as a prominent lobe, apically squarely truncate; inner margin of 5th joint in ♂ with 2 very shallow emarginations and 2 very feeble points or almost straight; in ♀ and juv. with 2 more or less conspicuous denticles; outer margin of 5th joint with feeble indications of 1–3 denticles; upper surface of wrist and hand in ♂ smooth,

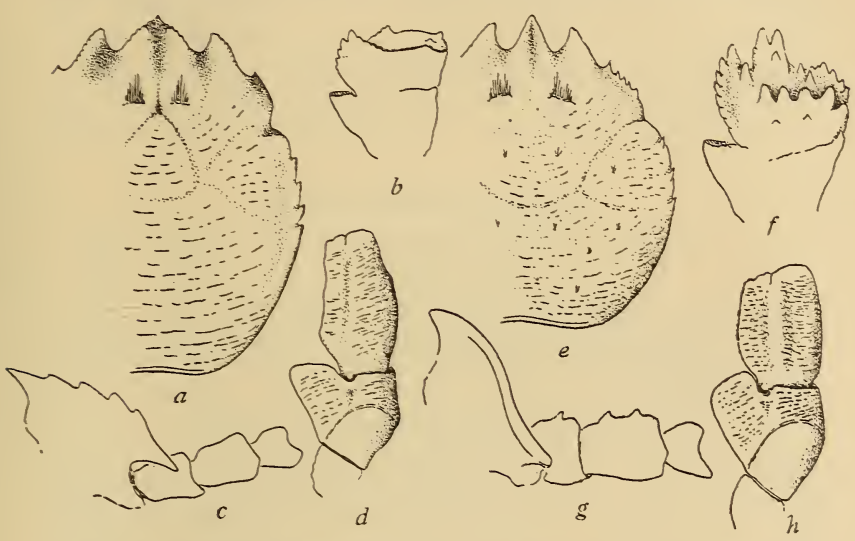


Fig. 88.—*Porcellana streptocheles* Stimpson. *a*, carapace. *b*, ventral view of left 1st antenna. *c*, ventral view of peduncle of left 2nd antenna. *d*, 3rd–5th joints of cheliped.
Porcellana dehaanii Krauss. *e–h*, as in *a–d* respectively.

very feebly transversely rugulose, in ♀ and juv. rather strongly rugulose-granulose, with the outer costate margin of hand and the median longitudinal ridge (when seen in profile) finely serrulate; finger and thumb of smaller chela contorted and furry on the inside in ♂. Both chelipeds relatively smaller and less unequal in ♀ than in ♂; either the right or the left cheliped may be the larger. Dactyls of legs with 3–4 conspicuous spines on lower margin.

Length of carapace up to ♂ 6·5 mm., breadth 6 mm., ♀ smaller. Various shades of red from pale flesh-coloured to indian red or bright crimson, chelipeds deeper in tint and more or less mottled, legs irregularly banded and mottled (K. H. B.).

Localities.—False Bay to Algoa Bay, littoral to 50 fathoms (Stimpson, Henderson, Stebbing, etc., and S. Afr. Mus.); off Umhlangakulu River (S. of Port Shepstone), Natal, 50 fathoms (1 ♀, S. Afr. Mus.).

Remarks.—If Stebbing in 1910 had had material from Natal he would undoubtedly have recognized the distinctness of this species, as Henderson did. Some of the differences commented on by previous writers are found to be sexual and not specific.

The "Valdivia" and Odhner's specimens from the Agulhas Bank are probably this species and not *dehaanii*. The "Gauss" specimens from Simon's Bay are certainly *streptocheles*, in spite of Strunck's remarks. Strunck made no mention of the peduncles of the antennae.

The single specimen from Natal seems to show that the distribution of the two species may overlap.

Porcellana dehaanii Krauss

Natal Porcelain Crab.

Fig. 88, *e–h.*

1843. Krauss, Südafrik. Crust., p. 59, pl. 4, fig. 2, *a–c.*

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 110 (compared with *streptocheles*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 378.

[Not *dehaanii* Stebbing, Balss, etc., see *streptocheles.*]

Median frontal tooth rather narrowly triangular, length subequal to its basal width; margins of frontal teeth less noticeably crenulate than in *streptocheles*; margin of carapace above peduncle of ant. 2 with several denticles in both sexes; lateral margin with 3 (or 4) rather widely spaced denticles. Surface of carapace with the grooves slightly more marked than in *streptocheles*; setules as in the latter, the ♂ slightly more setose, but the ♀ always far more setose than the ♂. 1st peduncular joint of ant. 1 with numerous conspicuous denticles. Basal peduncular joint of ant. 2 with acute apex as in *streptocheles*, but margin entire, though sometimes very minutely and feebly denticulate distally; front margin of the following 2 joints with resp. 1, and 2–3 denticles. Inner margin of 3rd joint of chelipeds always entire; inner apex of 4th joint produced as a prominent lobe but apically rounded; 5th joint relatively shorter and broader, the median ridge feeble but slightly more marked, inner margin always entire in ♂, ♀, and juv.; upper surface of wrist and hand smoother in both sexes than in *streptocheles*, sometimes even punctate instead of rugulose, the outer margin and median ridge not serrulate in ♀. Relative sizes of

chelipeds, and contortion of finger and thumb of the smaller one in ♂, as in *streptocheles*. The pitting on the larger chela is particularly noticeable in the Delagoa Bay ♂.

Length of carapace ♂ up to 8 mm., breadth 7·5 mm., ♀ smaller. Delagoa Bay ♂ 9 × 9 mm. Yellowish to salmon or brick-red, ♂ deeper and brighter in colour than ♀, more or less mottled, chelipeds more uniform, legs banded and mottled.

Localities.—Natal (Krauss); Isipingo (S. of Durban) and Impengazi (N. of St. Lucia Bay) (coll. T. A. Stephenson); Durban and Delagoa Bay (S. Afr. Mus.).

Remarks.—The median frontal tooth, the wrist of the chelipeds, and the basal joints of 1st and 2nd antennae suffice to distinguish this species at once from *streptocheles*.

Gen. Petrolisthes Stimpson

1892. Ortmann, Zool. Jahrb., vi, p. 258 (key to species).
1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 261.
1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 140.
1939. Melin, K. Sv. Vet. Ak. Handl., xviii, no. 2, p. 97.

Frontal margin more or less produced subtriangularly, undulate but not dentate. 1st joint of ant. 1 enlarged, but (in the South African species) not so thick or so broadly triquetral as in *Porcellana*. 1st joint of ant. 2 very short, not produced, not forming lower border of orbit and not excluding the following movable joints from the orbit. Chelipeds flattened, wrist rather long, not very unequal in ♂. Legs ending in a single claw.

Key to the South African Species.

1. Carapace and chelipeds finely granular. Inner margin of wrist of chelipeds with 3 or more teeth, outer margin with a ridge bearing several graduated and imbricate teeth . . . . . *lamarckii*.
2. Carapace and chelipeds coarsely granulate-tuberculate. Inner margin of wrist with one tooth near proximal end, outer margin without imbricate teeth. . . . *ornatus*.

Petrolisthes lamarckii (Leach)

Lamarck's Porcelain Crab.

Fig. 89, *a–d*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 825, pl. 2, fig. 7 (? *rufescens* Hell).

1894. Ortmann, Semon's Austral. Reise, v, p. 26 (references and discussion).

1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 162.

1918. Stebbing, Ann. Durban Mus., ii, p. 58 (*speciosus*).

1920. *Id.*, *l. c.*, p. 261 (*politus*).

1926. Laurie, *l. c.*, p. 140 (references).

Frontal margin broadly triangular, length (to transverse gastric ridges) half its basal width, margins undulate, apex narrowly rounded.

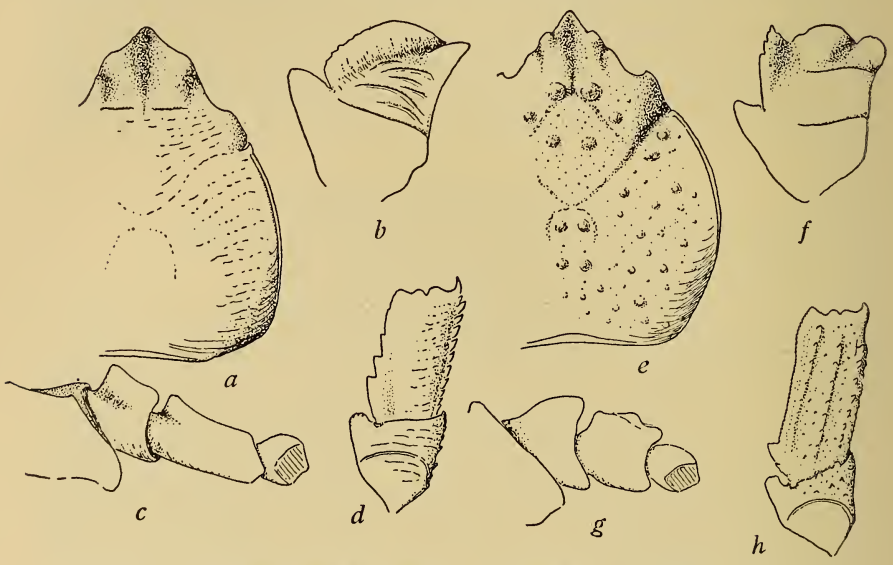


Fig. 89.—*Petrolisthes lamarckii* (Leach). *a*, carapace. *b*, ventral view of 1st joint of left 1st antenna. *c*, ventral view of left 2nd antenna. *d*, 4th and 5th joints of cheliped.
Petrolisthes ornatus Paulson. *e–h*, as in *a–d* respectively.

No supra-orbital spine. Epibranchial spine present. Lateral margin entire, costate. Surface feebly squamose-rugulose. 1st peduncular joint of ant. 1 with distal end abruptly narrowed to a transverse keel with a blunt point at outer distal angle. 2nd (1st free) peduncular joint of ant. 2 keeled on front margin along whole length, 3rd (2nd free) joint squarely prominent at its proximal front angle. 4th joint of cheliped with rounded lobe on inner (front) apex, 2 spines (sometimes only one) on lower distal margin, 5th joint about twice as long as wide, with 3 (or 4) low teeth on inner margin, the proximal one the most prominent, hind margin with a ridge bearing imbricate teeth increasing in size distally, surface of wrist and hand more or less squamose-

granulose, the sculpturing on the margins of the hand slightly stronger (as also on free edge of finger), finger and thumb not distorted, non-setose on inner (lower) surfaces. 4th joints of 2nd–4th legs without spines on front margin, outer surfaces feebly squamose-granulose, 4th joint of 4th leg $1\frac{3}{4}$ times as long as wide.

Length of carapace up to 13 mm., breadth 12 mm. Reddish, more or less mottled, or with symmetrical variegation, legs banded.

Localities.—Durban and Scottburgh, Natal (Stebbing); Durban and Delagoa Bay (S. Afr. Mus.).

Distribution.—Indo-Pacific.

Remarks.—The correct name for the South African specimens is difficult to fix. The South African Museum possesses a specimen caught at the same time and place as the one sent by Bell-Marley to Stebbing and recorded as *speciosus*. This specimen is identical with the Scottburgh one identified by Stebbing two years later as *politus*.

Ortmann regards *speciosus* as synonymous with *lamarckii*; in which case the species has a wide distribution in the Indo-Pacific. No extra-African material is available to me for comparison.

Petrolisthes ornatus Paulson

Ornate Porcelain Crab.

Fig. 89, *e–h*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 825, pl. 2, fig. 6 (*mossambica*).

? 1893. de Man, Notes Leyden Mus., xv, p. 293, pl. 7, figs. 3, 3, *a* (*indicus*).

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 374 (*mossambicus*).

1920. Stebbing, *l. c.*, p. 262.

Frontal margin broadly triangular, its length about $1\frac{1}{2}$ its basal width, margins markedly undulate owing to the marginal tubercle, apex subacute. No supra-orbital or epibranchial spines. Lateral margin entire, costate. Surface with low rounded tubercles and granules as in fig. 89, *e*. 1st peduncular joint of ant. 1 distally narrowed to a tridentate edge, the inner tooth sharp and minutely serrate, the other two rounded. 2nd (1st free) peduncular joint of ant. 2 with rather blunt keel on front edge, 3rd joint with 2 obscure rounded knobs on front surface. 4th joint of cheliped with small lobe at inner apex, lower distal margin without spines, 5th joint about twice as long as wide, with a tooth proximally on inner margin, upper

surface with 3 rows of spinous tubercles and smaller intervening granules, hand and finger and thumb tuberculate-granulate on upper surface, a submarginal fringe of setae on lower surface of hand externally, finger and thumb furry on lower inner surfaces. 4th joints of 2nd–4th legs coarsely granulose on their outer surfaces, 4th joint of 4th leg 1½ as long as wide.

Length of carapace 8 mm., breadth 7 mm.

Locality.—Mozambique (Hilgendorf, 1 ♀; and coll. K. H. B. 1912, 1 ♀).

Distribution.—Red Sea, Zanzibar. ? Flores.

Remarks.—A ♀ from Hilgendorf's locality agrees exactly with his description of *mossambica*. Stebbing accepted Nobili's identification of *mossambica* with the Red Sea *ornatus*, but gave no other synonymy. I have not seen Nobili's paper, but it seems to me that *indicus* de Man from Flores is undoubtedly synonymous.

Gen. Polyonyx Stimpson

1858. Stimpson, Proc. Ac. Nat. Sci. Philad., x, p. 229.

1907. *Id.* (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 194.

1926. Laurie, Trans. Linn. Soc. Lond., xix, pp. 146 *sqq.* (but *cf.* Gordon).

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 363.

1935. Gordon, Res. Voy. Ind. orient. Néerl., iii, fasc. 17, p. 10.

1936. Shen, Bull. Fan Mem. Inst. Biol., vi, p. 275 (list of species).

Carapace transversely ovoid, frontal margin not prominent, deflexed. 1st joint of ant. 1 large, apically truncate, not denticulate. 1st joint of ant. 2 transversely elongate. Chelipeds usually unequal, wrist rather long. Legs ending in 2 claws.

Remarks.—Commensal in the tubes of Polychaet worms (*Chaetopterus*, etc.) (see Pearse, Biol. Bull., xxiv, 1931, p. 102, figs. *), and in the galleries of Sponges.

Polyonyx cf. *biunguiculatus* (Dana)

Fig. 90.

1935. Gordon, *l. c.*, p. 10, fig. 5, *b*, *d*.

1936. Shen, *l. c.*, p. 276 (listed).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 378.

Main regions of carapace fairly well marked; carapace smooth and polished, lateral and hinder margins fringed with setae, front feebly produced. Basal joint of ant. 1 as in fig. 90, *b*. Mxp. 3 as in fig. 90, *c*.

* Quoted from Shen, *l. c.*, 1936. Apparently omitted from Zoological Record.

Chelipeds unequal, non-granulate, thickly furry on inner margin of wrist, lower outer border of hand and around base of finger; 4th joint without teeth, wrist about $1\frac{3}{4}$ as long as wide, finger of smaller chela with a row of denticles on upper outer edge, cutting surface with 2 rows of denticles, thumb (of smaller chela) with 2 rows of denticles on cutting surface, but the inner one only on the distal third. Legs furry on their margins, 6th joint with 2 spines on lower margin near base, sometimes preceded by an additional pair set transversely, and

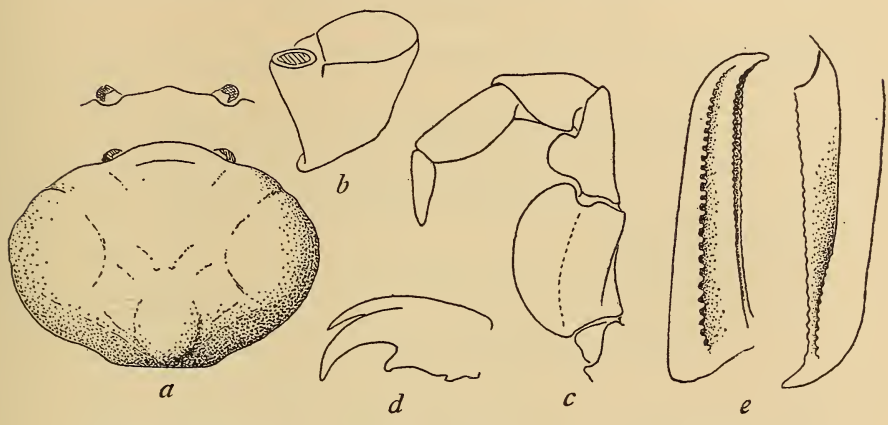


Fig. 90.—*Polyonyx* cf. *biunguiculatus* (Dana). *a*, carapace, with true vertical view of front. *b*, ventral view of 1st joint of left 1st antenna. *c*, 3rd maxilliped (setae omitted). *d*, dactyl of walking leg (setae omitted). *e*, outer side of finger and inner side of thumb of smaller chela, the two rows of denticles on the cutting *surface* shown although not actually visible from this point of view.

2 subapically, followed by a transverse pair; dactyl with 2 ungues close together, and one or two denticles on lower margin.

Length of carapace (ovig. ♀) 7.5 mm., breadth 10 mm. Orange- or salmon-coloured.

Locality.—Delagoa Bay (coll. van der Horst, in Polychaet tubes, 1 ovig. ♀, 1 non-ovig. ♀).

Remarks.—Owing to a certain confusion in the synonymy of the rather numerous "species" and the inadequacy of the descriptions, the name given to these specimens must be regarded as only provisional.

Family GALATHEIDAE.

1910. Stebbing, *l. c.*, p. 362.

1924. Gurney Rep. "Terra Nova," zool., viii, p. 176 (larval stages).

Carapace with well-defined regions, frontal margin produced in a prominent acute rostrum. Abdomen symmetrical, folded upon itself, not closely adpressed to underside of thorax. Tail-fan large. 1st antennae exposed. Peduncle of 2nd antennae directed forwards. 3rd and 4th joints of external (3rd) maxillipeds narrow. Cutting-edge of mandible entire. Chelipeds and walking legs usually elongate and slender.

Key to the South African Genera.

1. Eyes faceted and pigmented. Exopod of mxp. 1 with flagellum.
   a. Rostral process triangular with serrated edges (fig. 91, *i*). Abdominal segments unarmed . . . . *Galathea.*
   b. Rostral process spiniform (fig. 92, *a*). One or more of the abdominal segments with spines (usually) . *Munida.*
2. Eyes not faceted and not pigmented. Exopod of mxp. 1 without flagellum.
   a. Rostrum horizontal. No large spine in middle of carapace (fig. 92, *d*) . . . . . *Munidopsis.*
   b. Rostrum bent sharply upwards. A very large spine in middle of carapace (fig. 92, *e*, *f*) . . . *Galacantha.*

Gen. Galathea Fabr.

1910. Stebbing, *l. c.*, p. 362.
1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 139.
1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 123.
1939. Melin, K. Sv. Vet. Ak. Handl., xviii, no. 2, pp. 56 *sqq.*

Rostral process triangular, with serrated edges. Carapace and (usually) abdomen with transverse setose ridges or squamae (*cf.* fig. 92, *a*). Eyes faceted and pigmented. Exopod of mxp. 1 with flagellum. Abdominal segments unarmed.

Remarks.—The South African forms assigned to *intermedia* and *dispersa* should both be compared with European examples of these species.

Key to the South African Species.

1. Rostrum with 4 prominent teeth on both margins.
   a. Cervical groove indicated only laterally. Apices of finger and thumb of chelipeds acute. 4th joint of mxp. 3 longer than 3rd. Epipod on base of cheliped only . . . . . *intermedia.*

b. Cervical groove continuous across carapace. Apices of finger and thumb spooned. 4th joint of mxp. 3 subequal to 3rd. Epipods on bases of chelipeds and following two legs . . . . . *dispersa.*

2. Rostrum with 7 minute teeth on both margins. Epipod on base of cheliped only. Apices of finger and thumb acute. 3rd and 4th joints of mxp. 3 subequal . *elegans.*

Galathea intermedia Liljeb.

Fig. 91, *a–e.*

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 120 ("second species").

1894. Milne Edwards and Bouvier, Res. Sci. Camp. Monaco, vii, p. 79 (epipod), and p. 81, pl. 8, figs. 1–10.

1910. Stebbing, *l. c.*, p. 362 (*labidolepta*).

1913. Doflein and Balss, *l. c.*, p. 140, text-fig. 6, and pl. 12, fig. 2 (*labidolepta*).

1914. Lenz and Strunck, D. Südpol. Exp., xv, p. 286, and p. 287, fig. 1 (*labidolepta*).

1916. Balss, Beitr. Kennt. Meeresf. Westafr., ii, p. 40.

1917. Stebbing, Ann. S. Afr. Mus., xvii, p. 26.

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 13 (*intermedia* var.), and p. 25 (*labidolepta*).

1933. Monod, Bull. Etud. Afr. occid. Fr., xv, p. 18 (pagination of separate copy).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 378.

Rostrum with 4 prominent spinous teeth on each margin, the basal one smaller than the others and forming the inner supra-occipital spine. Lateral margin of carapace with 7–8 denticles, only one in front of the cervical groove, which is indicated only laterally (in this respect all the figures quoted above, even that of Lenz and Strunck, are misleading); the accessory denticle medial to the 1st lateral denticle mentioned by Strunck is not present in my material. Two submedian denticles on gastric region, sometimes with an accessory denticle external to each. No denticle on hepatic region. Front upper margin of pterygostomial region distinctly dentate (fig. 91, *d*). The ventral margin of the spine (fig. 91, *d*, sp.) below the socket of ant. 2 disappears about opposite the insertion of peduncle of ant. 2. 1st peduncular joint of ant. 1 with 2 strong spinous processes on lower external side of apical margin, each with a long spine and a seta; on inner (dorsal) side of apical margin a short blunt tooth. Mxp. 3 with

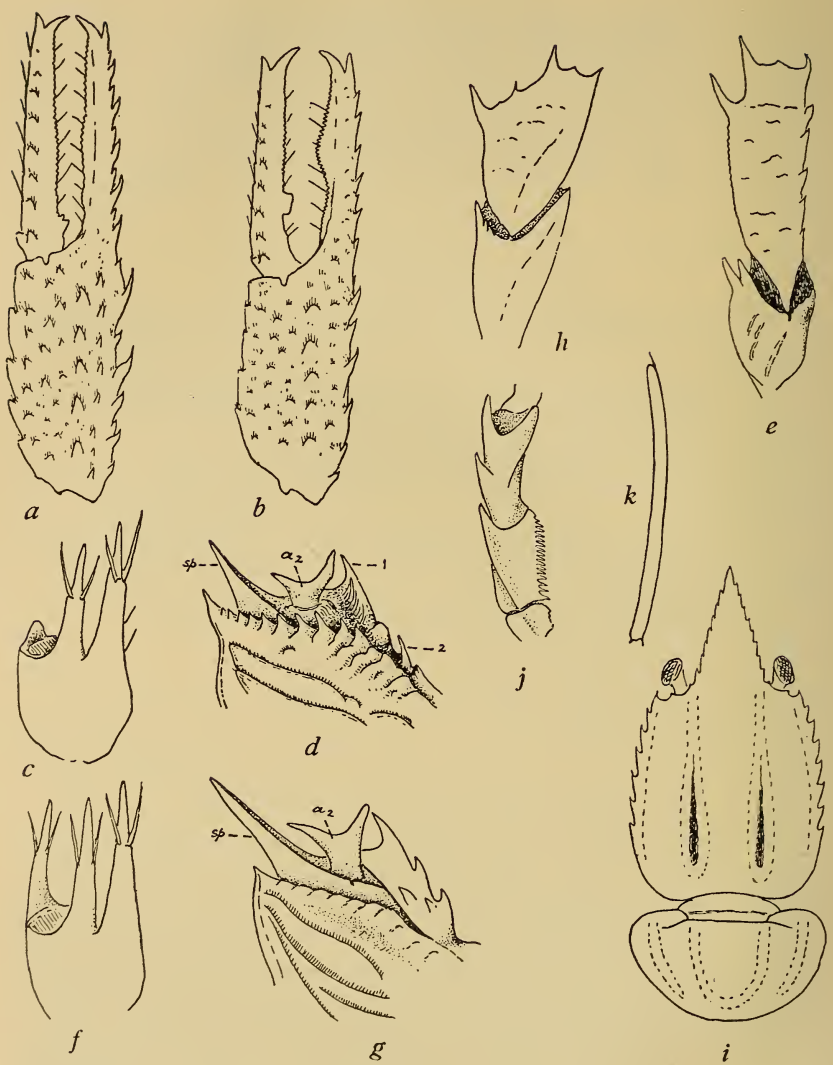


Fig. 91.—*Galathea intermedia* Liljeb. *a*, *b*, right chela ♀ and ♂, setae omitted. *c*, ventral view of 1st joint of left 1st antenna. *d*, ventral view of anterior corner of pterygostomial region of left side, with basal joint of antenna 2. (1, 2 = 1st and 2nd antero-lateral spines.). *e*, external view of 3rd and 4th joints of left mxp. 3.

Galathea dispersa Bate. *f*, *g*, *h*, as in *c*, *d*, *e* respectively.

Galathea elegans Ad. & White. *i*, carapace and base of abdomen, dotted lines indicating colour bands, transverse setose ridges not shown. *j*, inner view of 2nd–4th joints of right mxp. 3. *k*, seta from rostrum.

2 spine-teeth on inner ventral apex of 3rd joint, 4th joint longer than 3rd, narrow, inner ventral margin with 1 strong spine-tooth near apex, inner apex with a strong spine tooth, outer apex with a smaller curved one. Chelipeds, hand half as wide as long, finger and thumb slender, equal in length to hand, inner margins of both serrulate (Lenz and Strunck's figure is rather misleading), that of thumb sinuous, more so in ♂ than in ♀, forming a distinct gap, margin of finger with 1 tooth at base (in one ♂ with 2 teeth; *cf.* Doflein and Balss' figure); apices of finger and thumb in both chelipeds ending acutely in a spinous unguis, with a spine-tooth on outside, giving a bifid appearance; neither is spooned on inside. Epipod on base of cheliped, but not on any of the walking legs (stated by Doflein and Balss to be absent on the "thoracalfüssen" in *labidolepta*). Dactyls of all walking legs with 5 (sometimes 6) spines and tubercles, fewer in juv.

Length of carapace incl. rostrum up to 25 mm. Salmon or pinkish, with darker (brownish) transverse lines on carapace, and markings on abdomen, anterior segments of abdomen pale in median line, rostrum pale, cobalt-blue dots often on carapace and pterygostomial region (K. H. B.).

Localities: (*labidolepta*) Simon's Bay (Stimpson, Henderson, Lenz and Strunck); Agulhas Bank, St. Francis Bay, Cape Barracouta (Doflein and Balss, Odhner).

(*intermedia*) Mossel Bay (Stebbing); Port Alexander, Angola (Odhner); Simon's Bay, Agulhas Bank, Algoa Bay, East London, 20–42 fathoms (S. Afr. Mus.).

Distribution.—Europe, Mediterranean, Azores, Cape Verdes, Senegal; littoral to 318 metres.

Remarks.—It is strange that Stebbing (1917) in recording *intermedia* should have failed to comment on the remarkable likeness between this species and *labidolepta.* Neither Henderson nor Strunck also made any comment. The examination of several specimens (none larger than 10 mm. carapace length) confirms their agreement with Milne Edwards and Bouvier's account and figures, except that the dactyls of the legs are stouter than in the figure, with fewer spines (usually 5, sometimes 6, but fewer in juv.; M. Edwards and Bouvier: "about 7"), and no denticle on the hepatic region of carapace. (I have not seen Bonnier's 1888 paper.)

All the South African specimens recorded under the names of Liljeborg's and Stimpson's species are obviously one and the same species, and if they are really conspecific with *intermedia*, then Stimpson's *labidolepta* falls into synonymy.

This species resembles *australiensis* Stimpson, which also has an epipod only on the cheliped, in having the cervical groove present only at the sides.

Galathea dispersa Bate

Fig. 91, *f–h.*

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 119, pl. 12, figs. 6, 6, *a* ("first species").

1910. Stebbing, *l. c.*, p. 364.

1913. Doflein and Balss, *l. c.*, p. 139 (*nexa* Embleton).

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 5.

1916. Balss, *l. c.*, p. 39 (*nexa* Embleton).

1923. Odhner, *l. c.*, p. 25 (*nexa* Embleton).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 378.

Rostrum with 4 prominent spinous teeth on each margin, the basal one (inner supra-occipital) smaller than the others. Lateral margin with 9–10 denticles, 3 of which are in front of the well-marked and continuous cervical groove. An accessory denticle medial to the 1st lateral denticle and above the insertion of ant. 2. Six submedian denticles on the gastric region, and one very small one on the hepatic region. Front upper margin of pterygostomial region feebly crenulate (fig. 91, *g*). Ventral margin of the spine (fig. 91, *g*, sp.) below socket of ant. 2 continued past and behind the insertion of the antennal peduncle to meet the antero-lateral margin of (hepatic region of) carapace. 1st peduncular joint of ant. 1 with 3 strong spinous processes, 2 on ventral, 1 on inner dorsal apical margin, each with a long spine and a seta. Mxp. 3 with 1 spine-tooth (and 2 denticles externally) on ventral apex of 3rd joint, 4th joint subequal to 3rd, ovate, inner ventral margin with 1 strong spine-tooth in middle and 2 smaller ones near apex, outer apex with a small denticle. Chelipeds, all joints setose, hand $\frac{1}{2}$ to $\frac{2}{3}$ as wide as long, finger and thumb slightly shorter than hand, inner margins of both serrulate, and nearly straight or feebly sinuous, without any well-marked teeth, apices spooned and not appearing markedly bifid as in *intermedia*. Epipods on bases of cheliped and following 2 walking legs. Dactyls of all walking legs with 5 spines and tubercles.

Length of carapace incl. rostrum up to 16 mm. Dull salmon-red, with darker and brighter red spots and markings, apices of chelae deep crimson, eye-stalks reddish, cornea grey, a cobalt-blue wavy band along the pterygostomial and sub-branchial regions (K. H. B.).

Localities.—Simon's Bay (Henderson); St. Francis Bay (Doflein and Balss); off Gt. Fish Point * (Stebbing); Cape Barracouta and Walker Bay (Odhner); False Bay and Agulhas Bank to Natal and Zululand, 13–62 fathoms (S. Afr. Mus.).

Distribution.—Eastern North Atlantic, Mediterranean, Azores, Canaries.

Remarks.—This species appears to be commoner than *intermedia*, and is easily distinguished by several characters. But South African specimens of both this and the preceding species should be compared with European material before finally accepting their identity. Stebbing (1914) makes *nexa* Heller 1863 a synonym of *dispersa*, but distinct from the earlier *nexa* Embleton. Doflein and Balss (1913), Balss (1916), and Odhner (1923) all identify the South African form with *nexa* Embleton.

Both species occur together in the same localities in the western part of our area, but *intermedia* does not extend to Natal.

There appears to be considerable similarity between this species and *orientalis* Stimpson (see Stimpson, 1907, p. 231), but the latter has an epipod only on the cheliped (Ortmann, *l. c.*, 1894, p. 23).

The Bopyrid Isopod *Pseudione crenulata* Sars. occurs in the branchial cavity.

Galathea elegans Adams & White

Fig. 91, *i–k*.

1884. Miers, Zool. H.M.S. *Alert*, Crust., p. 278.

1888. Henderson, *l. c.*, p. 117, and p. 119, pl. 12, fig. 3 (*grandirostris*).

1894. Ortmann, Semon's Austral. Reise, v, p. 23.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 709.

1907. Stimpson (ed. Rathbun), Smiths. Misc. Coll., xlix, p. 234 (*grandirostris*).

1909. Southwell, Okhamandal Mar. Zool. Rep., pt. 1, p. 120, pl. fig. xi.

1915. Potts, Carnegie Inst. Wash. Dept. Mar. Biol., viii, p. 83, pl. 1, fig. 5, and fig. 4, A.

1921. Balss, K. Sv. Vet. Ak. Handl., lxi, no. 10, p. 22.

1926. Laurie, Trans. Linn. Soc. Lond., xix, p. 133 (references).

1939. Melin, K. Sv. Vet. Ak. Handl., xviii, no. 2, p. 77, figs. 48–53.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 379.

* 27° 7′ E. long. Not to be confused with Gt. Fish Bay, Angola.

Rostrum often somewhat depressed, at least half as long as rest of carapace, often nearly as long, each margin with about 7 very small denticles. All setae on rostrum simple, not plumose. Lateral margin of carapace with about 8 denticles (excl. external orbital angle). Cervical groove not continuous across carapace. Gastric region without denticles. Front upper margin of pterygostomial region very feebly crenulate. 1st peduncular joint of ant. 1 with 3 long spinous processes. Mxp. 3 with 1 tooth on ventral apex of 3rd joint, inner margin with comb-like serrations, 4th joint subequal to 3rd, inner ventral margin with 1 spine-tooth in middle and a larger one apically, outer apex shortly spinose. Chelipeds more or less setose, hand twice as long as broad, finger and thumb shorter than hand, their apices not spooned, inner margins serrulate, that of thumb sinuous, outer margins each with 2 denticles just behind the strong unguis. Epipod on base of cheliped, but not on any of the legs. Dactyls of walking legs with 4 spines, and a prominent tubercle at base of unguis.

Length of carapace incl. rostrum up to 9 mm. Brownish red or purplish, with 2 pale yellow stripes on carapace, and 4 stripes on abdomen, the 2 median ones confluent posteriorly, tail-fan with 3 pale stripes or bands.

Localities.—Durban and Delagoa Bay (S. Afr. Mus.).

Distribution.—India, East Indies, N. Australia, Philippine Is., S. Japan, Bonin Is., Seychelles.

Remarks.—The specimen from Durban harbour was found in a Feather-star (*Tropiometra carinata*) under a stone. Both the Crustacean and the Crinoid were coloured brown and pale yellow. Potts has referred to the fauna associated with Crinoids. Southwell describes a specimen with 3 dark purplish longitudinal bands on a yellow ground-colour on the carapace, and a dark band on either side of the chelipeds and legs. Miers and Laurie say the colour pattern is variable.

According to Melin the simple setae on the rostrum are characteristic of this species.

Gen. Munida Leach

1894. Ortmann, Semon's Austral. Reise, v, p. 24.

1901. Alcock, Ind. Deepsea Crust. Anomura, p. 237.

1910. Stebbing, *l. c.*, p. 364.

1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 141.

1935. Rayner, "Discovery" Rep., x, pp. 211–245 (Falkland Is. species, development, growth, *Grimothea* stage).

Rostral process spiniform, with a well-developed supra-orbital spine on either side at its base. Carapace and abdomen with transverse setose ridges and squamae. Eyes faceted and pigmented. Exopod of mxp. 1 with flagellum. One or more of the abdominal segments spiniferous (normally).

Key to the South African Species.

1. Several spines in a transverse row behind base of rostrum.
   - *a*. If present at all, spines on 2nd abdominal segment only.
     - i. Spines present on abdominal segment 2. 4th joint of mxp. 3 with 2 spine-teeth . . *sancti-pauli*.
     - ii. Spines present or absent on segment 2. 4th joint of mxp. 3 with 3 spine-teeth . . . *semoni*.
   - *b*. Spines present on 2nd and 3rd abdominal segments . *speciosa*.
2. Only 2 spines behind base of rostrum (fig. 92, *a*). Spines on 2nd–4th abdominal segments . . . . . *incerta*.

Remarks.—Bathymunida Balss 1914 is distinguished by the lamella uniting the three rostral (rostal and supra-orbital) spines forming a large rostral process; by the presence of 1 medio-gastric and 1 medio-cardiac spine; and by the transverse ridges on the carapace being shortened and divided up into squamae (*cf.* Melin, 1939).

Munida sancti-pauli Hend.

Fig. 92, *b*.

1910. Stebbing, *l. c.*, p. 364.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 44, pl. 4, figs. 12, 13.

A transverse series of 8 spines behind base of rostrum, the second from the middle line on each side larger than the others. Cervical groove continuous. No spines between the cardiac and branchial regions. Upper edge of pterygostomial region entire, or very feebly granulate. A transverse series of 8–10 spines on anterior margin of 2nd abdominal segment; the other segments non-spinose; posterior median portion of segments 2–4 smooth, without any setose grooves. 1st joint of ant. 1 with 2 apical spines (one on either side of insertion of 2nd joint), a long spine arising at or slightly beyond midway on outer upper surface and curving dorsally, and 1 spine arising at middle of outer surface. 4th joint of mxp. 3 with 1 strong spine-tooth slightly proximal to middle of lower inner margin, and a slightly smaller apical one. Apices of finger and thumb of chelipeds not spooned, outer

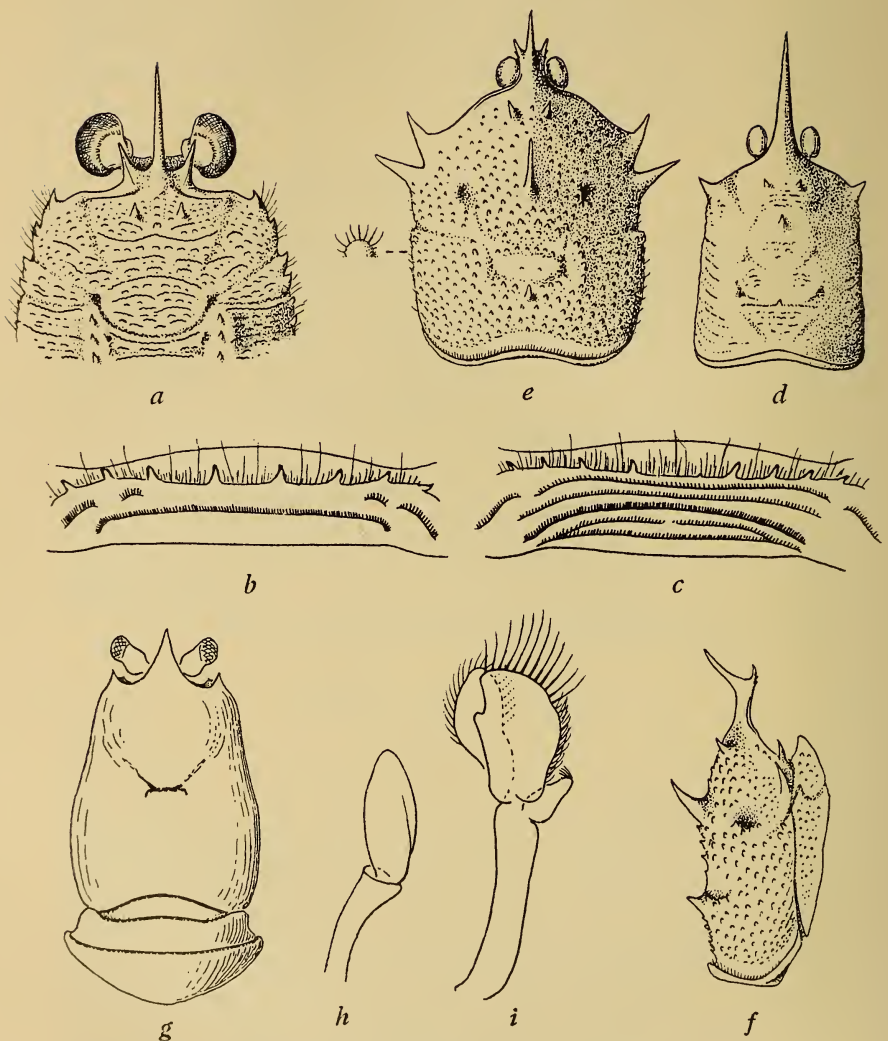


FIG. 92.—*Munida incerta* Hend. *a*, anterior portion of carapace.
Munida sancti-pauli Hend. *b*, median portion of 2nd abdominal segment.
Munida semoni Ortm. *c*, median portion of 2nd abdominal segment.
Munidopsis simplex (M. Edw.). *d*, carapace.
Galacantha rostrata M. Edw. *e*, carapace, with setiferous granule further enlarged.
f, lateral view of carapace.
Uroptychus nitidus (M. Edw.). *g*, carapace and basal segments of abdomen.
h, pleopod 1 ♂. *i*, pleopod 2 ♂, left side, posterior view.

margin of thumb (*excluding* outer margin of hand) with 3 spines and 2 near the apex, finger with 1 spine near apex.

Length of carapace incl. rostrum up to 30 mm.

Localities.—Off East London and Cape Morgan, 250–400 fathoms (Stebbing, and S. Afr. Mus.); off Cape Point, 250 fathoms (S. Afr. Mus.).

Distribution.—St. Paul's Rocks, Atlantic Ocean, 10–60 fathoms; Azores and Cape Verdes, 219–1229 metres.

Remarks.—Milne Edwards and Bouvier figure one of the ♂ chelipeds with a prominent tooth at base on inner margin of finger; but no such tooth is present in any of the South African specimens.

Bouvier (1922, p. 45) is inclined to consider *sancti-pauli* (1885) as a variety of *microphthalma* (1880) (by an oversight he makes the *earlier* species a variety of the *later* one).

Parasites.—The Bopyrid Isopods *Pseudione munidae* Brnrd. and *Paragigantione papillosa* Brnrd. are found in the branchial cavity.

Munida semoni Ortm.

Fig. 92, *c*.

1894. Ortmann, Semon's Austral. Reise, v, p. 24, pl. 1, fig. 4.

A transverse row of 12 spines behind base of rostrum. No spines on anterior margin of 2nd abdominal segment, or (in one specimen, figured) 9 spines (one asymmetrical and smaller); posterior median portion of segments 2 and 3 with 2 transverse setose grooves, that of segment 4 with one groove; setose grooves on pleura of segments 2–4 more numerous than in *sancti-pauli*. Ridges of the pterygostomial region fewer and less broken up into short discontinuous ridges. 4th joint of mxp. 3 with 3 strong spine-teeth. An additional subapical spine on inner margin of basal joint of ant. 2 (in the specimen with the spines on 2nd abdominal segment). Otherwise closely resembling *sancti-pauli*.

Length of carapace incl. rostrum up to 15 mm. (the same as in Ortmann's specimens).

Localities.—Off Scottburgh and Umhlangakulu River, Natal, 50–92 fathoms (S. Afr. Mus.).

Distribution.—Amboina, East Indies.

Remarks.—Although Ortmann says nothing about the *grooves* on the abdominal segments and his figure is inconclusive, in other respects these specimens agree fairly well with his description; the most distinctive resemblance being the 3 spine-teeth on 4th joint of mxp. 3. Ortmann's specimens had 6 spines on 2nd abdominal segment, but it

would seem that not only the actual number but also their presence or absence is a variable feature; the Natal specimens (4 without spines, 1 with spines) obviously all belong to the same species.

Munida speciosa von Martens

1883. Studer, Abh. K. Ak. Wiss. Berlin for 1882, p. 28, pl. 2, fig. 14, *a*, *b*.

1916. Balss, Beitr. Kennt. Meeresf. Westafr., ii, p. 41 (quoted).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 14 (with a query).

A transverse row of 6 spines behind base of rostrum. Anterior margin of 2nd abdominal segment with 8 spines, of 3rd segment with 6 spines (2–4: Odhner's small specimens); posterior portions of these segments with setose grooves across dorsum. Chelipeds slender, sparsely setose and with spines only on the 4th joint (Studer's figure). Mxp. 3 as in *banffica* (Odhner). 1st joint of ant. 1 not projecting beyond ocular peduncle.

Length of carapace incl. rostrum 31 mm. (Studer's figure).

Locality.—Port Alexander, Angola (Odhner).

Distribution.—10° N., 17° W., 115 (150) fathoms (Studer).

Munida incerta Hend.

Fig. 92, *a*.

1888. Henderson, Rep. H.M.S. *Challenger*, xxvii, p. 130, pl. 13, figs. 4, 4, *a*.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 122.

A single spine behind base of each supra-orbital spine. Antero-lateral margin of carapace with 5–6 spines. Three spines, one behind the other, separating each branchial area from the cardiac region. All the transverse ridges on carapace finely beaded. Anterior margin of abdominal segments 2–4 each with 4 spines (some not very prominent); posterior portion of segment 4 with prominent median spine. 1st peduncular joint of ant. 1 somewhat flattened dorso-ventrally, with a curved groove on dorsal surface from the insertion of 2nd joint; inner apex with 1 spine, followed by the insertion of 2nd joint, then 2 long spines and a smaller one on outer convex margin. Mxp. 3 with 1 spine at inner ventral apex of 3rd joint, 4th joint with 1 spine in middle of inner ventral margin, and a small one at apex. Chelipeds slender, elongate; finger and thumb slender, apically acute, inner margins of both with 2 teeth (♂).

Length of carapace incl. rostrum 38 mm.

Locality.—Portuguese East Africa (25° 56′ S., 32° 52′ E.) 17 metres (Barnard).

Distribution.—Philippine Islands, 250 fathoms.

Remarks.—There seems no reason to doubt the identity of the Delagoa Bay specimens (I have re-examined the ♂ which is in the South African Museum), unless the structure of the 1st peduncular joint of 1st antenna (not described by Henderson) should prove to be different.

Gen. Munidopsis Whiteaves

1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 148.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 6.

Rostral process spiniform, horizontal; no long spiniform supra-orbital spines, and no large spine in middle of carapace. Carapace strongly indurated, without transverse setose ridges. Eyes not faceted and not pigmented. Exopod of mxp. 1 without flagellum.

Munidopsis simplex (M. Edw.)

Fig. 92, *d*.

1914. Stebbing, *l. c.*, p. 7.

Rostrum slender, curving very slightly upwards. Antero-lateral angles shortly spiniform, behind which a small denticle on lateral margin, more or less distinct, often absent. Two denticles on gastric region, with a median one behind them (often obsolete), one median one on cardiac region; all of them more or less distinct. Lateral margin of carapace not indented by the cervical groove. Abdominal segments 2 and 3 each with a median denticle on anterior margin, sometimes also one on the posterior portion of the 2nd segment. 1st peduncular joint of ant. 1 with inner ventral apex acute, sometimes bifid or with subsidiary denticles, and 2 spines flanking externally the insertion of 2nd joint. 4th joint of mxp. 3 with a strong spine-tooth at base of inner ventral margin, followed by a smaller one. Chelipeds long and slender, finger and thumb slender, apices not spooned, inner margins in contact, serrulate, the serrulations increasing in size distally. No epipods on chelipeds or legs.

Length of carapace incl. rostrum up to 22 mm. Pale pinkish.

Localities.—Off Cape Point, 650–1000 fathoms (Stebbing, and S. Afr. Mus.); off west coast of Cape Peninsula, 250–300 fathoms (S. Afr. Mus.).

Distribution.—West Indies. ? N. Atlantic.

Gen. Galacantha M. Edw.

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 19.
1910. *Id.*, *l. c.*, p. 364.
1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 147.

Rostrum bent sharply upwards. No supra-orbital spines. Carapace strongly indurated; without transverse setose ridges; a very large spine in middle. Eyes not faceted and not pigmented. Exopod of mxp. 1 without flagellum.

Galacantha rostrata M. Edw.

Fig. 92, *e*, *f*.

1882. S. I. Smith, Bull. Mus. Comp. Zool. Harv., x, p. 21, pl. 9, figs. 2, 2, *a*.
1895. Faxon, Mem. Mus. Comp. Zool. Harv., xviii, p. 78, pl. B, figs. 1 (coloured), 1, *a*.
1910. Stebbing, *l. c.*, p. 364.

Carapace covered with blunt or subacute setiferous granules and tubercles, its posterior margin smooth (or feebly granulose). Rostrum with a pair of forwardly directed spines arising from its lower surface. Lateral margin of carapace with a large spine-tooth behind the one forming the antero-lateral corner, but none behind the cervical groove. Two small spines behind base of rostrum, a very large antrorse spine-tooth on gastric region, and a smaller one on cardiac region. A median antrorse spine on each of abdominal segments 2–4. Apex of 1st joint of ant. 1 with 3 teeth surrounding insertion of 2nd joint, the inner one small and subacute, the ventral one larger and apically rounded, the external one spiniform, longer than the others. 4th joint of mxp. 3 with 2 teeth (as in *M. simplex*). Chelipeds short (not much longer than carapace incl. rostrum) and moderately stout, finger and thumb hollowed on ventral surfaces, and apices somewhat spooned. Epipods on chelipeds and following 2 legs.

Length of carapace incl. rostrum 44 mm. Orange-red (Faxon).

Locality.—Off Cape Point, 900 fathoms (Stebbing).

Distribution.—Atlantic, off Pacific coast of America, East Indies, Bay of Bengal, Arabian Sea.

Family UROPTYCHIDAE.

1910. Stebbing, *l. c.*, p. 365.

1913. Doflein and Balss, D. Tiefsee Exp., xx, p. 134 (*Chirostylidae, Uroptychinae*).

1933. van Dam, Siboga Exp. monogr., xxxix*a*, 7, pp. vii, viii, 1–46 (*Chirostylidae*).

Carapace with regions not very well defined, frontal margin produced in an acute rostrum. Last thoracic sternum atrophied. Abdomen symmetrical, folded on itself, telson transversely fissured and folded against preceding segments. 1st antenna exposed. Peduncle of antenna 2 directed forwards. 3rd and 4th joints of mxp. 3 narrow. Cutting-edge of mandible serrate (normally).

Key to the South African Genera.

1. Rostrum well developed, acutely triangular. 5th joint of cheliped elongate (as long as hand). Exopod of mxp. 1 with flagellum. Mandible serrate . . . . *Uroptychus.*
2. Rostrum represented by a small spine. 5th joint of cheliped very short. Exopod of mxp. 1 without flagellum. Mandible not serrate . . . . . *Hapaloptyx.*

Gen. Uroptychus Hend.

1910. Stebbing, *l. c.*, p. 365.

1933. van Dam, *l. c.*, p. 18.

Carapace with lateral margins well defined. Rostrum well developed. Chelipeds elongate, slender, 5th joint as long as hand. Exopod of mxp. 1 with flagellum. 6th joint of mxp. 3 longer than the other joints. Mandible serrate. Acicle of ant. 2 well developed. Cornea pigmented.

Uroptychus nitidus (M. Edw.)

Fig. 92, *g–i*.

1910. Stebbing, *l. c.*, p. 365.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 49 (and var. *concolor*).

Rostrum acutely triangular. Carapace smooth, the regions not well defined; a small spine at antero-lateral angle, lateral margin not spinose. Chelipeds larger in ♂ than in ♀, hand cylindrical, widening slightly in ♂, but scarcely so in ♀; finger and thumb apically subacute,

hairy, inner margin of finger in both sexes with a squarish tooth, often notched or bifid, near base, inner margin of thumb with a triangular tooth or expansion in middle in ♂, near base in ♀, a gap between finger and thumb in ♂, especially in large ♂♂, in ♀ finger and thumb contiguous. Apical joint of 1st pleopod ♂ spoon-shaped, hollowed on anterior surface; 2nd pleopod, see fig. 92, *i*.

Length of carapace incl. rostrum up to 15 mm. Pinkish red.

Localities.—Off Cape Natal (Durban), 440 fathoms (Stebbing); off Cove Rock (East London), 80 fathoms (S. Afr. Mus.).

Distribution.—West Indies, eastern North Atlantic (Brittany to Cape Verdes), west coast of America.

Remarks.—Collected at only two localities off the South African coast by the s.s. *Pieter Faure*. In both cases the crustaceans were living amongst the branches of Alcyonarians (*Ceratoisis ramosa* Hickson).

Gen. Hapaloptyx Stebb.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 262.

1933. van Dam, *l. c.*, p. 44.

Carapace with lateral margin well defined. Rostrum represented by a small spine. Chelipeds (♀) rather short, 5th joint very short. Exopod of mxp. 1 without flagellum. 6th joint of mxp. 3 longer than the other joints. Mandible not serrate. Acicle of ant. 2 obsolete. Cornea pigmented.

Remarks.—A single known species. van Dam does not admit the genus as belonging to the *Uroptychidae* on account of the absence of the flagellum on exopod of mxp. 1, and the presence of an epipod on mxp. 2.

Hapaloptyx difficilis Stebb.

1920. Stebbing, *l. c.*, p. 263, pl. 25 (Crust., pl. 105).

A supra-orbital spine and a smaller spine between it and the antero-lateral spine. Lateral margin of carapace non-spinose. Hand of cheliped widening distally, finger and thumb with acute and overlapping apices.

Length of carapace 7 mm.

Locality.—Off Scottburgh, Natal, 92 fathoms (Stebbing).

Remarks.—Neither the type nor any of its parts mounted on a slide are in the South African Museum, and no further specimens have come to light.

THALASSINIDEA.

1903. Borradaile, Ann. Mag. Nat. Hist. (7), xii, pp. 534, 638 (classification).

1907. *Id.*, *ibid.* (7), xix, p. 476 (key).

1910. Stebbing, *l. c.*, p. 367.

1938. Gurney, "Discovery" Rep., xvii, pp. 293 and 299 *sqq.* (larval stages and classification).

1941. Lebour, Ann. Mag. Nat. Hist. (xi), 7, p. 411 (larval stages).

Carapace compressed, more or less well calcified. Rostrum more or less well developed. Last segment of the narrow thoracic sternum movable and independent. Abdomen symmetrical, extended, feebly calcified. Tail-fan well developed. Eyes small. 1st pair of legs chelate (or subchelate). Appendix interna on pleopods present or absent.

Remarks.—Loosely-built Crustacea, resembling the *Macrura* in shape, but with soft or feebly calcified abdomen. They dwell mostly in burrows in sand or mud, or in cavities in rocks, corals, or sponges.

Gurney has discussed (*l. c.*, p. 339) their classification in the light of the evidence derived from both larvae and adults. He suggests the separation into two groups: a Homarine group including the *Axiidae* and *Callianassidae*, and an Anomuran group including the *Upogebiidae* and *Laomediidae*. The superficial resemblance between the adult Upogebiids and Callianassids may well be due to the adoption of burrowing habits; but the larvae show certain important differences.

In the same paper attention is drawn to the close relationship between the *Nephropsidae* (*Astacidae*) and *Axiidae*, and the possibility that *Enoplometopus* should be transferred from the former to the latter (*l. c.*, p. 299).

Key to the South African Families (based on Gurney).

1. 1st and 2nd pairs of legs chelate. Appendix interna present on pleopods 3–5.
   - *a*. Epipods on legs. No *lineae thalassinicae*. 1st pair of legs equal or unequal . . . . . *Axiidae.*
   - *b*. No epipods on legs. *Lineae thalassinicae* present (*cf.* fig. 96, *a*, *b*). 1st pair of legs unequal . . *Callianassidae.*

2. 1st pair of legs equal, chelate, subchelate or simple; 2nd pair simple. No appendix interna on pleopods. Epipods on legs. *Lineae thalassinicae* present (fig. 96, *a*, *b*) . . *Upogebiidae.*

Both Borradaile and Gurney regard the *linea thalassinica* as of minor systematic importance, a view which receives considerable support from Pearse's observations (1911, Philipp, J. Sci. D., vi, p. 213), which seem to show that it is a modification for breathing in burrows, the sides of the carapace moving on the hinge of this line as if panting for breath (Gurney, *l. c.*, p. 342).

Family AXIIDAE.

1903. Borradaile, *l. c.*, p. 536.

1910. Stebbing, *l. c.*, p. 367.

1914. *Id.*, Ann. S. Afr. Mus., xv, p. 9.

1924. Gurney, "Terra Nova" Rep., zool., viii, p. 142 (larval stages).

1925. de Man, Siboga Exp. monogr., xxxix*a*, 5, pp. 1 *sqq.* (key to genera and list of species).

1938. Gurney, "Discovery" Rep., xvii, p. 299 (larval stages).

Rostrum moderate. Carapace without *lineae thalassinicae.* Acicle on ant. 2 present as a movable spinous process between 2nd and 3rd joints; a fixed spine outside the acicle on 2nd joint (fig. 93, *d*). 1st pair of legs chelate, large, equal or unequal; 2nd pair equal, ending in small chelae; 3rd–5th pairs simple, 5th sometimes tending to become subchelate. Epipods on legs. Abdominal pleurae well or moderately well developed. Pleopod 1 often reduced or absent; pleopods 2–5 with appendix interna, pleopod 2 in ♂ in addition with appendix masculina. No branchial filaments on pleopods. Uropod with endopod unjointed, exopod with or without transverse suture.

Key to the South African Genera and Subgenera.

I. Exopod of uropod without transverse suture.
  A. 6th joint of 3rd and 4th legs normal, *i.e.* longer than 5th joint.
    1. Profile of carapace not descending steeply to the rostrum.
      a. Rostrum triangularly pointed. Pleurobranchs on 2nd–4th legs . . . [*Axius*].
      b. Rostrum apically notched. No pleurobranchs . . . . . [subgen. *Neaxius*, Mauritius].
    2. Profile descending steeply to rostrum. Acicle and spine on ant. 2 absent . . . *Scytoleptus.*
  B. 6th joint of 3rd and 4th legs laminate, wider than 5th, fringed with setae (fig. 93, *b*) . . . . *Meticonaxius.*

II. Exopod of uropod with transverse suture. Carapace mediodorsally keeled.
  A. Antennal acicle and spine small (fig. 93, *i*) . . *Calocaris.*
  B. Antennal acicle and spine large (fig. 93, *d*) . subgen. *Calastacus.*

Stebbing's species *Axius longispina* is transferred by de Man to *Meticonaxius*. *Axius* (*Neaxius*) *acanthus* var. *mauritiana* Bouvier 1915 is found at Mauritius.

Gen. Scytoleptus Gerst.

1856. Gerstaecker, Arch. Naturg., xxii, p. 155.

1882. Kingsley, Bull. Essex Inst., xiv, p. 26 (*Evaxius*). (Neave' Nomencl. gives date 1883, vol. xiv, for 1882, p. 130.)

1925. de Man, *l. c.*, pp. 5, 49.

Carapace arched in front, marked off by a ridge on each side of the medio-dorsal ridge, each of the 3 ridges ending anteriorly in a strong tooth; profile descending steeply to the rostrum. Eyes pigmented. No acicle or spine on ant. 2. Exopod of uropod without suture.

Scytoleptus serripes Gerst.

1856. Gerstaecker, *l. c.*, p. 158, pl. 6, figs.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 827.

1882. Kingsley, *l. c.*, p. 26, pl. 1, fig. 1 (*Evaxius tricarinatus*).

1915. Bouvier, Bull. Sci. Fr. Belg. (7), xlviii, p. 21, figs. 8, 9.

1925. de Man, *l. c.*, p. 49, pl. 4, figs. 9, 9, *h* (details).

Rostrum narrow-triangular, acute. Median keel ending in an up-turned spine.

Length up to 46 mm. (de Man).

Localities.—South Africa, probably Port Natal (Gerstaecker); Mozambique (Hilgendorf).

Distribution.—Mauritius, Aldabra, Madagascar, East Indies, Philippine Is.

Gen. Meticonaxius de Man

1905. de Man, Tijdschr. Ned. Dierk. Ver. (2), ix, p. 592 (August).

1905. Bouvier, C.R. Ac. Sc. Paris, cxli, p. 804 (*Metaxius*) (November).

1925. de Man, *l. c.*, pp. 5, 53.

1925. Bouvier, Mem. Mus. Comp. Zool. Harv., xlvii, p. 469 (Metaxius).

1928. de Man, Siboga Exp. monogr., xxxix*a*, 6, pp. 18, 20, 21.

Carapace arched, cervical groove indistinct, no *lineae thalassinicae*; rostrum triangular, apically pointed or blunt, carinate, margins unarmed. Abdominal pleurae small. Eyes not faceted, faintly pigmented. Acicle of ant. 2 well developed. Mxp. 3 with or without

exopod. 1st pair of legs equal, larger than 2nd pair; 6th joint of 3rd and 4th pairs laminate, shorter than 5th joint, fringed with setae; 5th pair subchelate. Exopod of uropod without suture.

Remarks.—de Man seems to be convinced that the West Indian genus *Metaxius* is synonymous. In 1925 he placed the genus among the *Axiidae*, but in 1928 he transferred it to the Callianideine group of the *Callianassidae* (no *linea thalassinica* and general appearance like that of the *Axiidae*). According to de Man *Meticonaxius* and *Callianidea* have an appendix interna on the 2nd (and following) pleopods; as also has *longispina* according to Stebbing.

Meticonaxius longispina (Stebb.)

Fig. 93, *a–c.*

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 265, pls. 26, B, 27 (Crust., pls. 106, B, 107).

Rostrum with low median keel, apex bluntly rounded, with a few (irregular) setiferous crenulations. Eye-stalks large, cornea scarcely pigmented (as preserved). Mxp. 3 with exopod on both right and left sides in the type (mounted on a slide), and in another specimen; 4th joint with a spine-tooth (easily overlooked) on inner margin in type, and on right side only in the second specimen. Long spine on the scaphognathite (vibratory plate) of 2nd maxilla present in the second specimen as in type. Chelipeds equal. Apex of 6th joint of 5th leg shortly produced, with 2–3 strong spines amidst a thick brush of long setae, dactyl slightly more than half length of 6th joint, spoon-shaped, setose, pectinate on one margin, unguis minute, up-turned. Pleopod 1 slender, uniramous; pleopods 2–5 with appendix interna. 6th abdominal segment keeled in the type, but not in the smaller specimen. Telson with hind margin broadly rounded.

Length 33 mm. (Stebbing); second specimen 12 mm.

Localities.—Off Cape Morgan, 52 fathoms (Stebbing); off East London, 50 fathoms (S. Afr. Mus.).

Remarks.—Two slides with some of the appendages of the type are in the South African Museum. The above description of the rostrum, and the figure, are taken from the smaller specimen, probably a young ♀.

From *monodon* de Man (East Indies) this species differs in the shape of the rostrum, and the relative lengths of the 6th and 7th (dactyl) joints of 5th leg (the *shape* of the dactyl is probably not different from that of *longispina*).

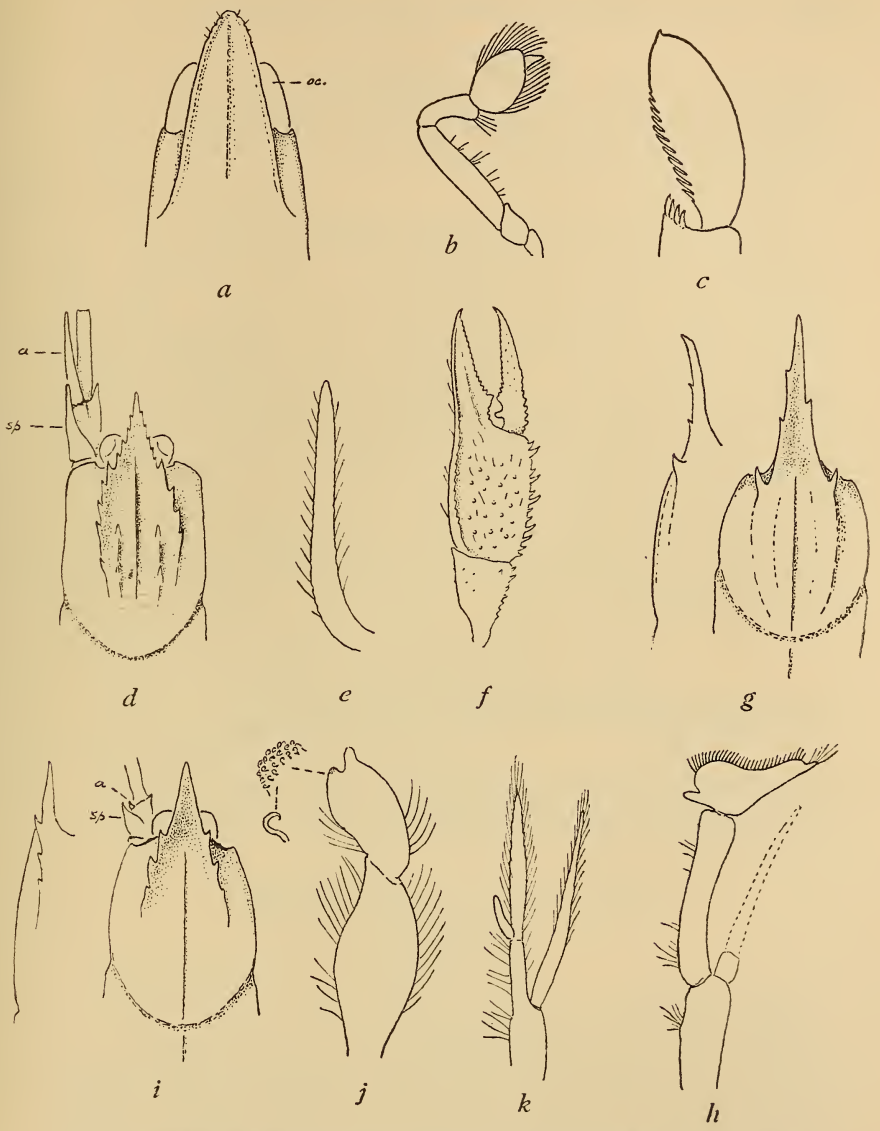


FIG. 93.—*Meticonaxius longispina* (Stebb.). *a*, front of carapace, with eyes (*oc*). *b*, 3rd leg. *c*, dactyl of 5th leg, setae omitted.

Calocaris (*Calastacus*) *longispinis* McArd. *d*, front of carapace, with antennal spine (*sp*) and acicle (*a*). *e*, 1st pleopod ♀. *f*, left chela, outer surface.

Calocaris alcocki McArd. *g*, front of carapace, with profile. *h*, left 2nd pleopod, posterior view, terminal joint drawn as if flattened, actually at right angles to plane of paper.

Calocaris barnardi Stebb. *i*, front of carapace, with profile, and base of antenna 2. *j*, pleopod 1, with coupling-hooks further enlarged. *k*, pleopod 2 (drawn to a smaller scale than pleopod 1).

Gen. Calocaris Bell

1910. Stebbing, *l. c.*, p. 367 (*Calastacus*, as full genus).
1914. *Id.*, Ann. S. Afr. Mus., xv, p. 9.
1915. *Id.*, *ibid.*, xv, p. 58.
1925. de Man, *l. c.*, pp. 7 (list) and 114 (key to species).

Carapace arched, cervical groove distinct, a medio-dorsal keel throughout (except in one species), and a serrated keel from each lateral margin of rostrum nearly to cervical groove. Abdominal pleurae (behind the 1st) well developed. Eyes non-faceted, scarcely or not at all pigmented. Antennal acicle and spine large or minute. Mxp. 3 with exopod. 1st pair of legs much larger than 2nd; 3rd–5th pairs slender, elongate, simple. Pleopod 1 slender, uniramous, pleopods 2–5 with appendix interna (normally). Exopod of uropod with transverse suture.

Remarks.—The eggs are large and comparatively few in number. The earliest larval stage is a *Zoea*, having mxp. 3 biramous and natatory (Calman).

Key to the South African Species.

1. Antennal acicle and spine minute (fig. 93, *i*) (*Calocaris* s.s.).
   a. Rostrum up-curved. Chelipeds slender, hand as long as finger . . . . . *alcocki.*
   b. Rostrum straight, horizontal. Chelipeds stout, hand only two-thirds length of finger . . . . *barnardi.*
2. Antennal acicle and spine large (fig. 93, *d*) (*Calastacus*). . *longispinis.*

Calocaris (*Calocaris*) *alcocki* McArdle

Fig. 93, *g*, *h*.

1915. Stebbing, *l. c.*, p. 59.
1925. de Man, *l. c.*, p. 116 (in key).

Rostrum apically up-turned, dorsally grooved, with 1–2 teeth on lateral margin, and one larger tooth on each epigastric region. Chelipeds slender, a spine on apex of upper margin of 4th and 6th joints, lower border of 4th joint smooth, finger and thumb subequal to hand. 2nd pleopod with apical joint boot-shaped, set at right angles to plane of preceding joints (*i.e.* parallel with long axis of abdomen), the toe pointing backwards.

Length up to 54 mm. (McArdle).

Locality —Off Cape Natal (Durban), 440 fathoms (Stebbing).

Distribution.—Bay of Bengal, 542 fathoms.

Remarks.—From an examination of the remains of Stebbing's specimen, I am able to confirm his statement that none of the pleopods carry an appendix interna. The 1st pleopods apparently were removed by Stebbing.

Calocaris (*Calocaris*) *barnardi* Stebb.

Fig. 93, *i–k*.

1914. Stebbing, *l. c.*, p. 9, pl. 2 (Crust., pl. 66).

1925. de Man, *l. c.*, p. 116 (in key).

Rostrum straight, horizontal (even slightly down-turned), dorsally grooved, lateral margin entire, but 2–3 teeth on the continuation on the epigastric region. Chelipeds stout, a spine on apex of upper margin of 4th and 6th joints, lower border of 4th joint spinose, near lower margin on outside of hand a ridge with a spine. Pleopod 1, basal joint fusiform, 2nd joint ovate, with subapical lobe on inner margin bearing numerous coupling-hooks; pleopods 2–5 similar to one another, with appendix interna. Telson longer than broad, apex broadly rounded, with slight median notch.

Length up to 38 mm. Pale buff, chelipeds salmon.

Locality.—Off Saldanha Bay, 89 fathoms (Stebbing); 29°S., 16° 45′ E., 84 m. (Fisheries Survey).

Remarks.—Three cotypes all agree as regards the pleopods; they show the ♀ genital openings on the 3rd coxae, but are non-ovigerous.

Calocaris (*Calastacus*) *longispinis* McArdle

Fig. 93, *d–f*.

1910. Stebbing, *l. c.*, p. 367.

1925. de Man, *l. c.*, p. 118 (in key).

♀. Rostrum with 4 (left) and 5 (right) denticles on lateral margins, 5 (left) and 4 (right) teeth on their continuations on the epigastric region. Median keel on carapace without any tooth or denticle. Between it and the outer keels 2 teeth on either side, the hindmost of the left side feebly developed. Eye-stalks movable. Antennal spine not reaching to $\frac{1}{4}$ length of 4th joint, acicle reaching to end of 4th joint. 4th joint of mxp. 3 with 4 spines, increasing in size distally, on inner (lower) margin. Chelipeds unequal, left the larger, lower margin of 3rd joint with a few denticles and a larger apical tooth, lower margin of 4th joint with a few minute denticles proximally and

a tooth about in the middle, lower *outer* margin distally serrulate and ending in a small tooth, upper margin with 4 spines distally, 5th joint spinulose distally on upper margin, 6th joint with upper margin spinulose, spines mostly in pairs (6), long and short ones alternating, a salient serrulate ridge along outer lower border, continued on to thumb, outer surface of 5th and 6th joints with scattered miliary granules and setae, inner margins of finger and thumb serrulate, finger of larger chela with a tooth in the proximal excavation (feeble in the smaller right chela). Pleopod 1 simple, curved, sparsely setose; pleopods 2–5 with appendix interna. Telson longer than 6th abdominal segment, longer than broad, oblong, apically rounded-truncate, with a minute median spinule. Endopod of uropod with 5–6 minute spinules and tufts of setules on median ridge; some spinules along the suture on exopod.

Length 62 mm.

Locality.—Off Cape Point (Table Mountain, N. 79° E., distant 40 miles), 700 fathoms (Stebbing).

Distribution.—Arabian Sea and Gulf of Oman, 300–700 fathoms.

Remarks.—The above description is from the same ovigerous ♀ which Stebbing had already compared with McArdle's and MacGilchrist's descriptions. He considered the South African specimen identical with *longispinis* in spite of certain differences.

Two other species have been described from the Arabian Sea: *felix* and *investigatoris*. Alcock's (1901) description of the cheliped of the latter applies very well to the South African specimen.

Family CALLIANASSIDAE.

1903. Borradaile, Ann. Mag. Nat. Hist. (7), xii, p. 544 (part: *Callianassinae*).

1907. *Id.*, *ibid.* (7), xix, p. 476 (*Callianassinae*).

1910. Stebbing, *l. c.*, p. 369 (part).

1924. Gurney, "Terra Nova" Rep., zool., viii, p. 157 (larval stages).

1928. de Man, Siboga Exp. monogr., xxxix*a*, 6, pp. 18 *sqq.* (part).

1938. Gurney, "Discovery" Rep., xvii, pp. 299 *sqq.* (larval stages).

Rostrum small or minute, inconspicuous. *Lineae thalassinicae* present (*cf.* fig. 96). Antennal acicle minute or obsolete. 1st pair of legs (chelipeds) unequal, chelate; 2nd pair chelate; 3rd and 4th pairs simple (4th sometimes feebly subchelate); 5th pair chelate, the finger closing *laterally* against the thumb. No epipods on legs. Pleopod 1 uniramous, reduced in ♂; pleopod 2 biramous; pleopods 3–5 foliaceous,

with appendix interna. No branchial filaments on pleopods. Uropod without suture on either endopod or exopod.

Gen. Callianassa Leach

1814. Leach, Edin. Encycl., vii, p. 400.

1866. Stimpson, Proc. Chicago Ac. Sci., i, p. 46 (*Glypturus*).

1903. Borradaile, *l. c.*, p. 544.

1910. Stebbing, *l. c.*, p. 369 (*Callichirus* and *Calliactites*).

1928 (May). de Man, Capita Zool., II, 6, pp. 1–56, pls. 1–12.

1928 (Dec.). *Id.*, *l. c.* (Siboga Exp.), pp. 25 (list) and 91 *sqq.* (key to species).

1935. Schmitt, Smiths. Misc. Coll., xciii, no. 2, p. 1 (Atlantic American species).

1937. Gurney, Proc. Zool. Soc. Lond., ser. B, pp. 326–330, figs. (larval stages).

1944. *Id.*, Proc. Zool. Soc. Lond., cxiv, p. 82.

Length of carapace medio-dorsally in front of cervical groove much greater than (more than twice) length behind the groove. Eye-stalks flattened against one another (except in *Scallasis*). 1st pair of legs (chelipeds) unequal (except in one South Australian species), chelate, finger and thumb stout, not longer than hand; 2nd pair chelate; 4th pair often feebly subchelate; 5th pair with the dactyl closing laterally against a thumb-like projection of the 6th joint to form a small chela. Pleopod 1 in ♂ short, rod-like, in ♀ longer, sigmoid, pleopod 2 biramous (foliaceous in *C. caecigena*); pleopods 3–5 foliaceous, appendix interna present, but often inconspicuous.

Remarks.—Five subgenera have been recognized by Borradaile and de Man; but I agree with Gurney (1937 and 1944) that these divisions are very unsatisfactory. There appear to be transitional forms between these somewhat loosely defined subgenera, and therefore all the South African species are included under *Callianassa*. More intensive study may lead to a subdivision based on more precise criteria (Gurney, 1944).

Bopyrid parasites of the genera *Ione*, *Ionella*, and *Pseudione* are found in the branchial chamber.

Key to the South African Species.

1. 6th joint of 3rd leg with a lobe on hind margin, with characteristic T or hammer-head appearance (fig. 94, *d*). Appendix interna on pleopods 3–5 triangular, inconspicuous, not projecting beyond inner margin of ramus (fig. 94, *i*).

A. Endopod of uropod oval, extending well beyond apex of telson, which is distinctly broader than long.
1. Frontal margin unispinose (with rostral point but no tooth on antero-lateral margin).
a. Mxp. 3 operculiform, 3rd, 4th, and 6th joints expanded (fig. 94, *a*) . . *kraussi.*
b. Mxp. 3 pediform, 3rd–5th joints narrow, 6th expanded (fig. 95, *a*) . . . *gilchristi.*
2. Frontal margin trispinose, a tooth on antero-lateral margin in addition to rostrum. Mxp. 3?. . . . . [*martensi*, Mauritius].
B. Endopod of uropod square-ended, not extending beyond apex of telson. Mxp. 3 operculiform, 3rd–6th joints expanded (fig. 95, *f*) . . . *natalensis.*
II. 6th joint of 3rd leg oval, more or less obliquely articulated to 5th, but without definite lobe on hind margin (fig. 95, *l*). Appendix interna on pleopods 3–5 rod-like, projecting. Mxp. 3 operculiform, 3rd and 4th joints expanded . . . . . *rotundicaudata.*

Two Mauritian species, *C. mauritiana* Miers (1882, Proc. Zool. Soc. Lond., p. 341, and 1884, *ibid.*, pl. 1, figs. 2, 2, *a*; de Man, 1928 (May), p. 10, pl. 2, fig. 4) and *C. martensi* Miers (1884, Proc. Zool. Soc. Lond., p. 13, pl. 1, figs. 1, 1, *a–c*), are both inadequately known.

Callianassa (*Callichirus*) *kraussi* Stebb.

Fig. 94.

1900. Stebbing, Mar. Invest. S. Afr., i, p. 39, pls. 2, 3.
1910. Stebbing, *l. c.*, p. 369.
1928 (Dec.). de Man, *l. c.*, p. 113 (in key).

Frontal margin slightly concave on either side of the small rostral point. 3rd peduncular joint of ant. 1 longer than 1st and 2nd together; peduncle of ant. 2 much shorter than that of ant. 1. Mxp. 3 operculiform, 3rd and 4th joints broadly expanded, 4th broader than long, 5th oval, 6th lobately expanded, broader than long, 7th slender. The larger cheliped on either right or left side, usually the left; 3rd joint denticulate on lower margin, inner surface and lower outer surface granulate; 4th joint with lower margin expanded proximally into a rounded lobe, curving evenly to the narrow apex, denticulate, inner surface and lower outer surface granulate; 5th joint longer than wide, lower margin denticulate, especially at rounded proximal corner, inner surface granulate only near lower margin and upper margin proximally and distally, proximally an ovoid sunken area defined by

a thin membranous line, outer surface smooth, nitidulous, a few granules on distal margin below junction with 6th joint; 6th joint (hand) longer than broad, measured along dorsal margin subequal to

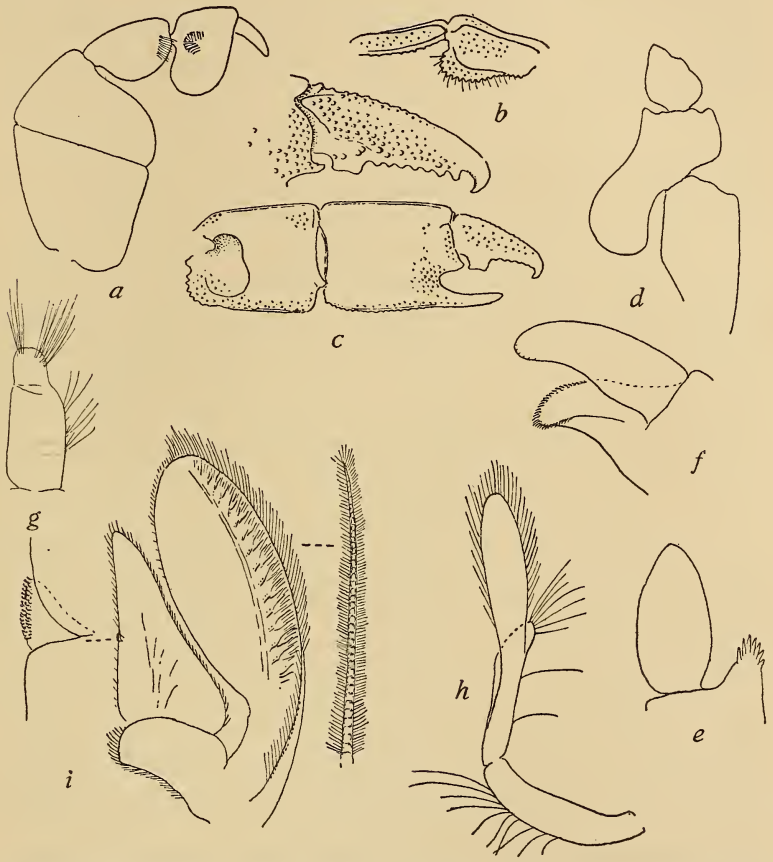


Fig. 94.—*Callianassa kraussi* Stebb. *a*, mxp. 3, inner view, setae omitted except special ones on 5th and 6th joints. *b*, inner view of 3rd and 4th joints of cheliped. *c*, inner view of wrist and hand chela, with outer view of finger further enlarged. *d*, 3rd leg, setae omitted. *e*, apex of 6th joint and dactyl of 4th leg, setae omitted. *f*, apex of 6th joint and dactyl of 5th leg, setae omitted. *g*, 1st pleopod ♂, left side, posterior view. *h*, 1st pleopod ♀, left side, posterior view. *i*, 3rd pleopod, with marginal seta and appendix interna further enlarged.

5th joint, upper and lower margins in both 5th and 6th joints thinly costate, inner surface granulate along lower margin and around distal excision and inner edge of thumb, feebly also along dorsal margin, outer surface granulate only around distal excision; finger overlapping thumb, apically hooked, inner margin with square tooth proximally

(in specimens from about 45 mm. upwards), inner and outer surfaces granulate except outer margin distally. Smaller cheliped, lower margin of 4th joint feebly denticulate, 5th twice (or almost) as long as wide, 6th joint measured along dorsal margin half as long as 5th, inner and outer surfaces of 5th and 6th joints smooth, finger and thumb subequal, apically acute, their opposing margins serrulate. In juv. the larger cheliped is less strongly granulate, thumb with its inner cutting-edge denticulate, finger with apex not hooked, and proximal tooth undeveloped, 5th joint slightly longer than 6th measured along upper margin. 3rd leg hammer-shaped, 6th joint strongly lobed, dactyl broadly subtriangular. 6th joint of 4th leg with lower apex shortly produced and tipped with several spines, dactyl ovate, unguis obsolete. 5th leg chelate in a lateral (not vertical) direction, 6th joint apically produced as a spoon-shaped process edged with a series of spines, dactyl attached on inside at base of this process and closing against it laterally (not closing "down" on it as Stebbing says), spoon-shaped, apically rounded, with smooth margin. Both 4th and 5th legs apically densely setose. A tuft of shaggy setae on postero-inferior corner of 3rd abdominal segment and in middle of lower margin of 4th and 5th segments. Pleopod 1 in ♂ short, stout, apically blunt, with 2 bunches of long setae, outer margin sinuous, with a few long setae; in ♀ slender, rather elongate, sigmoid, the distal joint with a short lobe about in middle on anterior surface (possibly the remnant of the exopod). Pleopod 2 biramous, the outer ramus elongate-oval, slightly longer than the inner (not *vice versa* as Stebbing says), inner ramus apically blunt. Pleopods 3–5 large, foliaceous, outer ramus oval, its outer margin fringed with plumose setae which appear submoniliform or articulated, inner ramus shorter, triangular, appendix interna a small triangular plate attached on anterior surface of ramus and scarcely projecting beyond the straight inner margin, with a double or treble row of coupling-hooks. Telson broader than long, broadest across middle, hind margin truncate, setose near lateral corners. Uropod extending well beyond telson, outer ramus sub-triangular, densely fringed with setae, with another, submarginal, curved band of setae from outer corner, inner ramus oval, inner margin and apex setose.

Length up to 70 mm., larger cheliped 60 mm. Smallest specimen examined 15 mm. Pale yellowish or buff, deeper on abdomen, uropods gamboge, a pink or crimson line or suffusion medianly on 1st–3rd abdominal segments, chelipeds white or pale pink, deeper pink along upper borders, especially externally.

Localities.—Gordon's Bay, False Bay (Stebbing); Saldanha Bay, and Klaasjagers Lagoon (west coast of Cape Peninsula) (S. Afr. Mus.); Kalk Bay, St. James, Muizenberg Vlei, Strand, Gordon's Bay (all in False Bay), Kleinmond (mouths of Bot and Palmiet Rivers), Still Bay, Zwartkops estuary (Port Elizabeth), Kasouga Lagoon (south of Port Alfred), Nahoon River (East London) (S. Afr. Mus.); Port Edward, Natal (coll. T. A. Stephenson); Kosi Bay (Univ. Cape Town Ecol. Surv., 1946, 1948).

Remarks.—Stebbing described the ♀, with sigmoid 1st pleopod. Less reduction has taken place in the ♀ evidently because the pleopods are needed to help in retaining the eggs. Females are apparently much rarer than males, and I have not seen an ovigerous one.

But for its presence on the west coast of the Cape Peninsula one might be suspicious of the record from Saldanha Bay; two specimens from this latter locality were collected by the late Dr. Gilchrist together with *Upogebia capensis.*

Callianassa gilchristi Brnrd.

Fig. 95, *a–e.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 379.

Rostral point rather well developed, spiniform, extending half-way (or nearly) along eye-stalks, no teeth on antero-lateral margin. Eye-stalks apically acute, cornea rather large. 3rd peduncular joint of ant. 1 longer than 1st and 2nd together; peduncle of ant. 2 extending half-way (or a very little more) along 3rd peduncular joint of ant. 1. Mxp. 3 slender, pediform, 3rd and 4th joints together 4 times as long as wide, inner surface of 3rd joint smooth, 5th joint narrow, expanding slightly distally, 6th joint expanded, as long as wide. Larger cheliped ♂ (missing in the ♀ specimen), 3rd joint widening distally, lower margin serrulate, upper margin of 4th joint granulate or beaded (except distally), lower margin serrate, proximally widening to a sharp tooth, then indented, distally convex, inner surface and lower part of outer surface of 3rd and 4th joints granulate, 5th joint longer than wide, upper margin with a few indents on the in-turned costate edge, lower proximal corner rounded, serrate, the serrae somewhat in-turned and obscured by the intervening tufts of setae, 6th joint slightly narrower than 5th, width slightly less than length of upper margin, thumb with outer cutting-edge denticulate, inner edge granulate, lower margin of hand and thumb with the tufts of setae very closely set forming a thick fringe, finger with cutting-edge denticulate, upper margin near hinge

with several granules, outer and inner surfaces of 5th and 6th joints smooth and polished. Smaller cheliped (♂ and ♀), 5th joint 2½ times

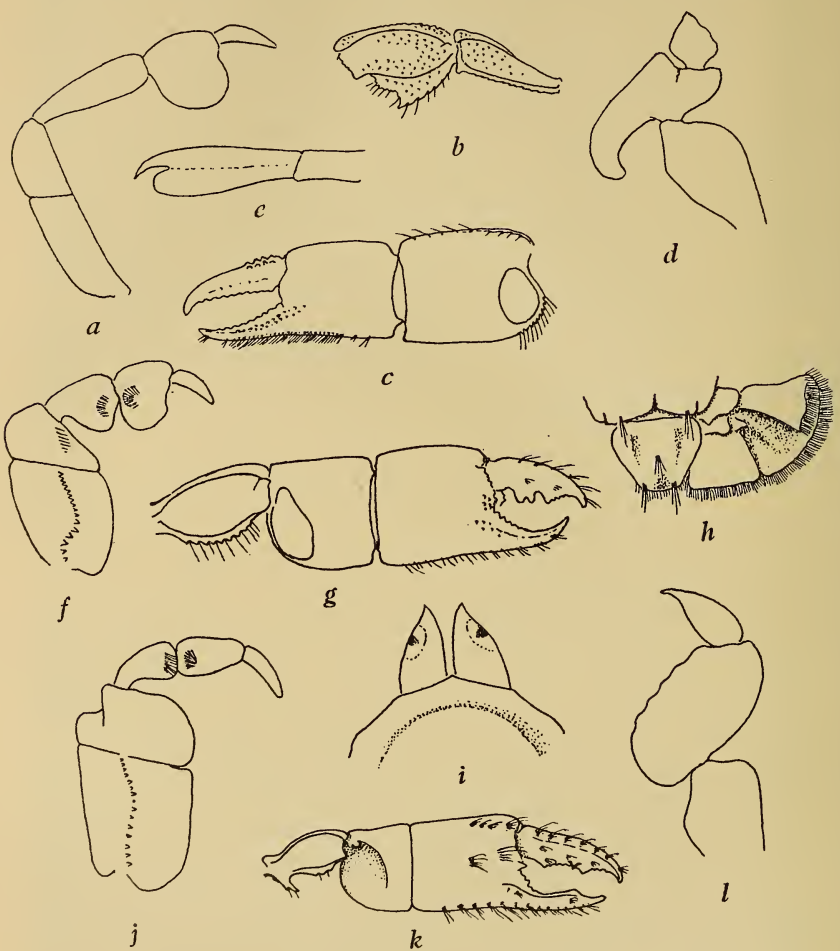


Fig. 95.—*Callianassa gilchristi* Brnrd. *a*, mxp. 3, setae omitted. *b*, inner view of 3rd and 4th joints of cheliped ♂. *c*, inner view of wrist and hand of larger cheliped ♂. *d*, 3rd leg, setae omitted. *e*, 1st pleopod ♂, setae omitted. *Callianassa natalensis* Brnrd. *f*, mxp. 3, setae, except special ones, omitted. *g*, inner view of cheliped ♀. *h*, telson and uropod. *Callianassa rotundicaudata* Stebb. *i*, front of carapace with eyes. *j*, inner view of mxp. 3, setae, except special ones, omitted. *k*, inner view of cheliped ♂. *l*, 3rd leg, setae omitted.

as long as wide, not quite as long as 6th joint incl. thumb. 6th joint of 3rd leg with strongly developed posterior lobe, which is slightly

hooked. 4th and 5th legs as in *kraussi*. Pleopod 1 ♂ apically bilobed, outer lobe acute; a slight longitudinal groove seems to indicate the original biramous character of the appendage. Pleopod 1 ♀ sigmoid as in *kraussi*. Pleopods 3–5 as in *kraussi*. Telson broader than long, hind margin straight, postero-lateral angles rounded, each with a tuft of setae, a transverse setiferous groove across median portion nearer base than hind margin. Uropod extending well beyond telson, inner ramus ovate, apically rounded, outer ramus subtriangular, with marginal and submarginal fringe of setae, a spinule at base on the low median ridge.

Length up to 68 mm.

Localities.—False Bay, Durban Bay, and off Natal coast, 20 fathoms (S. Afr. Mus., A942 and A6807).

Remarks.—The non-ovigerous ♀ (larger cheliped missing) from False Bay agrees with the two Natal ♂♂.

Callianassa natalensis Brnrd.

Fig. 95, *f–h*.

Cf. 1905. de Man, Tijdschr. Ned. Dierk. Ver. (2), ix, p. 605 (*indica*).

1928 (Dec.). *Id.*, *l. c.*, p. 160, pl. 17, figs. 26, 26, *g* (*indica*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 379.

Rostral point very short, triangular, no tooth on antero-lateral margin. Eye-stalks apically subacute. 3rd peduncular joint of ant. 1 subequal to 2nd joint; peduncle of ant. 2 extending beyond peduncle of ant. 1 by half length of its 5th joint. Mxp. 3 operculiform, 3rd–6th joints broad, 3rd with curved row of denticles on inner surface, 4th broader than long, triangular, distal and inner margins oblique, 5th widening distally but a little longer than broad, 6th broader than long. Larger cheliped (♀), inner and outer surfaces smooth, polished, 3rd joint widening distally, lower margin with 2 feeble denticles distally, 4th joint with lower margin evenly convex (the joint widest in middle, not near base as in *kraussi*), serrate and setose, 5th joint as broad as long, lower hind corner rounded, entire (feebly crenulate owing to insertions of setae), 6th joint with upper margin equal to that of 5th (or a trifle longer), thumb shorter than rest of hand, broad basally, tapering to a sharp point, outer cutting-edge denticulate, a few granules on inside near base of thumb, and on distal margin near finger hinge, finger stout, cutting-edge with 2 strong teeth, the proximal one bifid, the second one triangular; smaller cheliped, 5th joint longer than broad, its upper margin almost twice

as long as that of 6th joint, thumb and finger longer than upper margin of 6th joint. 3rd–5th legs as in *kraussi*. Pleopod 1 (♀) sigmoid as in *kraussi*; pleopod 2 biramous; pleopods 3–5 as in *kraussi*. Telson a little broader than long, lateral margins gently converging to rounded-truncate hind margin. Uropod, inner ramus not extending beyond telson, trapezoidal, square-ended, outer ramus broadly triangular, with marginal and submarginal fringes of setae.

Length non-ovig. ♀ 100 mm., larger cheliped 50 mm.

Locality.—From stomach of Rock Cod, Natal coast (S. Afr. Mus., A8339).

Remarks.—Appears to bear considerable resemblance to *indica* de Man, a large Javanese species (90 mm.) described from a single ♂ without the larger cheliped. Both *indica* and the present specimen differ from *mauritiana* in the proportions of the 6th joint of mxp. 3.

Callianassa (*Calliactites*) *rotundicaudata* Stebb.

Fig. 95, *i–l*.

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 41, pl. 8.

1910. Stebbing, *l. c.*, p. 369.

1928 (Dec.). de Man, *l. c.*, pp. 26, 94, and 97 (in key).

Frontal margin feebly scalloped, rostral point very feeble. 3rd peduncular joint of ant. 1 longer than 1st and 2nd together; peduncle of ant. 2 nearly as long as that of ant. 1. Mxp. 3 operculiform, inner surface of 3rd joint with gently curved longitudinal line of denticles, 3rd and 4th joints broadly expanded, 4th broader than long, 6th ovate, not expanded. Larger cheliped on right side in type, on left in 4 other specimens, larger in ♂ than in ♀; 3rd joint rather rapidly expanded distally, feebly serrulate on lower margin distally, 4th joint oval, smooth, lower margin with 2 or 3 feeble setiferous indents, a projecting tooth proximally, which usually has 1 or 2 setiferous indents, 5th joint wider than long, smooth, with a few isolated setae, inner surface proximally hollowed, more or less membranous, demarcated by a straight transverse line, 6th joint longer than 5th, width subequal to upper margin in ♀, but less in ♂, thumb in ♂ feebly grooved and denticulate along inner edge, in ♀ tapering more evenly, cutting-edge sharper, serrulate, cutting-edge of finger in ♂ more or less feebly denticulate, with 2 slight prominences, a larger tooth on either side of the distal prominence, cutting-edge in ♀ sharper; numerous tufts of setae along upper and lower margins of 6th joint, thumb, and finger, better developed in ♂ than in ♀; smaller cheliped in both sexes slender,

5th joint longer than upper margin of 6th. 6th joint of 3rd leg oval and set rather obliquely on 5th but without basal lobe and not truly hammer-head shaped, dactyl ovate-lanceolate. 6th joint of 4th leg not apically produced, dactyl more terete and digitiform than in *kraussi*, with stout unguis. 5th leg with the produced spoon-shaped apex of 6th joint and the spoon-shaped dactyl closing together in a lateral direction (as in *kraussi*), the margin of the former edged with close-set spines, that of latter smooth. Both 4th and 5th legs apically densely setose. Abdominal segments 1 and 2 not coalesced (contrary to Stebbing's statement), the terga and intervening membrane being quite distinct; a tuft of shaggy setae on postero-inferior corner of 3rd segment and on middle of lower margin of 4th and 5th segments. Pleopods 1 and 2 absent in ♂. Pleopod 1 in ♀ sigmoid as in *kraussi*; pleopod 2 biramous. Pleopods 3–5 foliaceous, outer ramus narrow (width less than greatest width of inner ramus), curved, fringed with plumose articulated setae as in *kraussi*, inner ramus triangular, appendix interna distinct, projecting, rod-like. Telson broader than long, lateral and hind margins evenly rounded. Uropod extending well beyond telson, outer ramus obovate, outer margin densely fringed with setae and a curved submarginal band (of setae, not spinules as Stebbing says) from outer corner, inner ramus broadly oval, inner margin and rounded apex fringed with setae.

Length up to ♂ 47 mm., ♀ 50 mm.; larger cheliped ♂ 35 mm., ♀ 30 mm. Eggs 1·3–1·75 mm. diam. Translucent white when alive, larger chela pinkish, eggs yellow.

Localities.—St. Francis Bay, 30–34 fathoms (Stebbing); Strand and Gordon's Bay (False Bay), low tide (S. Afr. Mus.); Algoa Bay, low tide (Port Elizabeth Mus.).

Distribution.—Ceylon (see de Man, 1928 (Dec.), pp. 26, 94).

Remarks.—A smaller ♂, 25 mm. in length, has the same characteristics of the larger chela, *e.g.* the terete thumb, but the cutting-edges of both finger and thumb are sharper, and the tooth on either side of the distal prominence on the former is not developed.

Family UPOGEBIIDAE.

1903. Borradaile, Ann. Mag. Nat. Hist. (7), xii, p. 542 (*Callianassidae*, part: *Upogebiinae*).

1907. *Id.*, *ibid.* (7), xix, p. 476 (*Upogebiinae*).

1910. Stebbing, *l. c.*, p. 369 (*Callianassidae* part).

1924. Gurney, "Terra Nova" Rep., Zool., viii, pp. 164 *sqq.* (larval stages).

1928. de Man, Siboga Exp. monogr., xxxix*a*, 6, pp. 18 *sqq.* (*Callianassidae*, part).

1938. Gurney, "Discovery" Rep., xvii, pp. 330 and 340 *sqq.* (larval stages and systematic position).

Rostrum well developed. *Lineae thalassinicae* present (fig. 96, *a*, *b*). Antennal acicle more or less distinct. 1st pair of legs (chelipeds) equal, chelate or simple; 2nd pair simple; * 3rd and 4th pairs simple; 5th pair feebly subchelate. Epipods present on legs. Pleopod 1 absent in ♂, uniramous in ♀; pleopods 2–5 foliaceous, without appendix interna. No branchial filaments on pleopods. Uropod without sutures on either endopod or exopod.

Gen. Upogebia Leach

1910. Stebbing, *l. c.*, p. 370, and *Calliadne*, p. 370.

1927. de Man, Capita Zool., II, 5, pp. 1–58, pls. 1–6.

1928. *Id.*, *l. c.*, pp. 22 (list) and 35 *sqq.* (key to species).

1937. Gurney, Proc. Zool. Soc. Lond., ser. B, p. 98 (larval stages).

1940. Poulsen, Vidensk. Meddel. Dansk. Naturh. For., civ, p. 216.

1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 273 (subg. *Calliadne*).

The length of the carapace medio-dorsally in front of cervical groove approximately equal to, or not considerably greater than, length behind the groove. 1st pair of legs chelate, or subchelate (in one species simple in the ♀ only); uropods not longer than telson.

Remarks.—The fairly abundant material of "*capensis*" in the South African Museum can be divided into two lots: (*a*) those with a spine on the upper apex of 4th joint of 1st leg (cheliped), and coxal spines on 1st–3rd legs; (*b*) those without these spines. The first lot occur on the west coast from Luderitzbucht to Table Bay, and two isolated localities on the south coast; the second lot occur from False Bay (east side) to East London (and possibly Natal).

Krauss' original locality was Table Bay. de Man found that 2 ♀♀ from Luderitzbucht had the coxal spines (1928, *l. c.*, p. 51), and included *capensis* in his key (*ibid.*, p. 41) under "*g*2. Upper border of merus of chelipeds armed with a spine near the distal extremity." Stimpson's locality was Simon's Bay, where the same form occurs at the present day; and he included in his brief description the diagnostic feature of the coxal spines.

Ortmann in describing a damaged specimen from Algoa Bay

* Chelate in *Bigea*, known only from an old drawing (see Borradaile, 1903).

expressly mentioned the absence of spines on 4th joint of 1st leg (see also his figure) and the coxal spines.

Obviously, if two species are to be recognized, one is Krauss' *capensis* and the other Ortmann's *africana*. It is a great pity that Stimpson's *subspinosa* must be suppressed, as he drew attention to one of the two crucial diagnostic features.

Bopyrid parasites of the following genera are recorded as living in the branchial chamber, *Ione*, *Pseudione*, *Aporobopyroides*, and *Upogebiophilus*, and from between the pleopods, *Phyllodurus*.

Key to the South African Species.

1. Finger of cheliped much longer than thumb (fig. 97, *b*).
   - *a*. Antero-lateral border of carapace with a small spine above antenna 2. A gill on base of 5th leg.
     - i. Coxae of 1st–3rd (♂) or 1st and 2nd (♀) legs with a spine. 4th joint of cheliped with spine on upper margin near apex (fig. 96, *c*, *d*) . . *capensis*.
     - ii. No coxal spines. 4th joint of cheliped without spine . . . . . *africana*.
   - *b*. No spinule on antero-lateral border of carapace. No gill on 5th leg . . . . . *assisi*.
2. Finger and thumb of cheliped subequal, crossed (fig. 97, *f*). Antero-lateral border of carapace without spinule (*Calliadne*).
   - *a*. No spines on upper margin of 4th joint of cheliped . *savignyi*.
   - *b*. 2–4 spines near apex on upper margin of 4th joint of cheliped . . . . . *rhadames*.

Upogebia capensis (Krauss)

Fig. 96.

1843. Krauss, Südafrik. Crust., p. 54 (*Gebia major* var. *capensis*).

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., xii, p. 22 (*subspinosa*).

1891. Ortmann, Zool. Jahrb., vi, p. 54.

1910. Stebbing, *l. c.*, p. 370 (*subspinosa*).

1913. Balss, Schultze Reise, v, p. 108, fig. 8 (cheliped) (fig. 7: cheliped of *major*, Japan, for comparison) (excl. Stebbing (1910) and Ortmann (1894) from synonymy).

? 1914. Lenz and Strunck, D. Südpol Exp., xv, p. 291 (probably *capensis*, but coxal spines not mentioned).

1916. Balss, Beitr. Meeresf. Westafr., ii, p. 34 (excl. localities: Port Elizabeth and Algoa Bay).

1927. de Man, *l. c.*, p. 32, pl. 3, fig. 12 (telson) (excl. Ortmann (1894) from synonymy).

1928. *Id.*, *l. c.*, pp. 37, 41 (in key), 51 (*capensis* and *subspinosa*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 380.

[Not *capensis* Stebbing 1900 and 1910 = *africana*.]

Front tridentate, lateral teeth not extending half-way along rostrum, no tooth or spine on lower surface of rostrum; a smooth medio-dorsal groove anteriorly, and a smooth groove between lateral teeth of front and rostrum extending back to cervical groove. Rostrum, lateral keel, and anterior portion of carapace granulate-tuberculate, more or less concealed in short thick pile. Several distinct denticles on hind margin of cervical groove below the *linea thalassinica*, and 1 or 2 indistinct ones above it. Projecting lateral lobe of epistome (behind base of ant. 2) more or less quadrate, with (usually) a spinule on its anterior corner. 2nd joint of ant. 2 with (usually) a spinule on upper margin; acicle well developed, ending in a single spine. Eyes feebly pigmented. Chelipeds very slightly more robust in ♂ than in ♀, 4–5 spinules on lower outer margin of 3rd joint, 4th joint with upper margin rather strongly convex, descending rather steeply to junction with 5th joint, a spine on its inner upper margin near apex (often curved and adpressed), inner and outer lower margins denticulate, with 4–5 larger spines proximally where the two denticulate margins run together; 5th joint with 1 apical spine on upper margin, with several spinules or denticles external to it, 1 spine on middle of inner apical margin, a larger medio-ventral spine, lower outer margin formed by a smooth ridge ending in a spine; 6th joint upper margin with 2 serrulate or spinose and setiferous ridges, with a third ridge on inner side, and a series of squamiform setiferous granules on outer side, all 4 ridges with smooth intervening grooves, lower margin spinulose proximally, outer surface with squamiform setiferous granules, larger and more thickly set ventrally and distally, a more or less spiniform tooth near finger-hinge, inner surface with squamiform setiferous granules above and distally, and a spiniform tooth at base of thumb and a smaller one opposite middle of finger, proximal part smooth and glabrous, bounded below by a straight groove from which arises a thick fringe of long setae; thumb with 2–3 blunt denticles on inner edge in juv. and half grown, but usually quite smooth in adult; finger triquetral in cross-section, inner surface nearly flat, with a median longitudinal line of granules, with a few above and below it proximally, lower margin denticulate, one or two nearest the hinge being larger, and a row of granules external and close to the lower denticulate margin, upper

surface oblique, *i.e.* sloping downwards and outwards, forming a shallow smooth groove bordered above (actual upper margin of fingers: Stimpson's "crenulate carina") and below by a series of

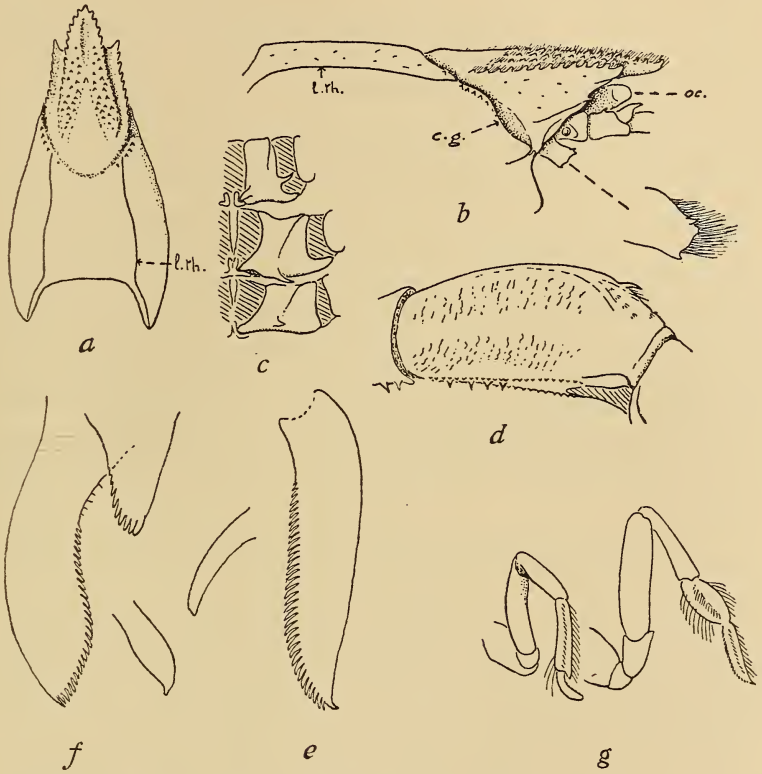


FIG. 96.—*Upogebia capensis* (Krauss). *a*, dorsal view of carapace, showing *linea thalassinica* (*l.th.*), pile omitted. *b*, lateral view of anterior part of carapace, showing *linea thalassinica*, cervical groove (*c.g.*), eye (*oc.*), with lateral lobe of epistome further enlarged. *c*, bases of 1st–3rd legs ♂, membranous areas cross shaded. *d*, outer surface of 4th joint of 1st leg. *e*, dactyl of 3rd (and 4th) leg, setae omitted. *f*, apex of 6th joint and dactyl of 5th leg, setae omitted. *g*, 4th and 5th legs of right side *in situ*, to show torsion of distal three joints of 5th leg.

denticles or serrulations. 4th joint of 2nd leg with (usually) a spine (curved or adpressed) on upper margin near apex, 5th joint with a spine on upper apex and a smaller one external to it. 3rd–5th legs without spine on upper margin of 4th and 5th joints. Dactyls of 3rd and 4th legs ensiform, front margin setose, unguis distinct and curved forwards, hind margin closely and strongly pectinate, the spines curving outwards so that hind surface is concave; with a backward

sweeping motion of the limb this joint acts as a scoop. 6th joint of 5th leg subchelate, with its (true) lower apex produced as a thumb-like process, hollowed on side opposite dactyl, with stout apical spine and graduated marginal spines; dactyl curved and hollowed on its lower surface, its (true) outer margin pectinate to the blunt apex, no distinct unguis; as the 5th joint does not articulate in the normal manner with the 4th joint (*i.e.* with movement in the same vertical plane) but is folded sideways against the 4th joint (their true outer surfaces being thus contiguous), the lower margins of the 6th joint and dactyl face outwards, the dactyl acting as a scoop in the opposite direction to that of the dactyls of 3rd and 4th legs; its true outer margin (pectinate) is now next to the body (fig. 96, *g*). Coxal joints of 1st–3rd legs with a sharp spine: on 1st coxa situated on the distal margin, on 2nd and 3rd coxae near middle of hind margin; all three spines distinct in ♂, but the 3rd one in ♀ is reduced to a blunt tubercle on outer rim of genital opening, or obsolete. A single gill on base of 5th leg. Pleopod 1 in ♀ styliform with blunt apex; in ovigerous ♀ setose. Pleopods 2–5 with outer ramus ovate-lanceolate, inner ramus considerably smaller, oval. Both rami of uropod broadly subtriangular. Eggs small and numerous.

Length up to 80 mm. (carapace 26 mm.). Smallest specimen examined 15 mm. (Stebbing, 8 mm.), and a post-larva 4 mm. Bluish green.

Localities.—Luderitzbucht (Balss); Saldanha Bay (S. Afr. Mus.); Table Bay (Krauss, and S. Afr. Mus.); Simon's Bay (Stimpson, Lenz and Strunck, and S. Afr. Mus.); St. James and Kalk Bay (west side of False Bay) (S. Afr. Mus.); Mossel Bay (S. Afr. Mus.).

Remarks.—The extension of this west coast species around the south-west corner of the Cape to Mossel Bay is curious; further collecting may prove its existence at intermediate localities, although it is significant that it seems to be confined to the *western* part of False Bay, where ships touch. Mossel Bay is also a port of call.

Although Balss (1913) says upper margin of 4th joint of cheliped is quite smooth, his fig. 8 gives a very strong suspicion of the presence of an *adpressed* spine.

The differences between Stimpson's description of the finger of the cheliped and de Man's description (1928, p. 51) are merely verbal; both are correct, though de Man's is the better.

The denticulation of the inner margin of the thumb is a juvenile character, which does not persist in the adult.

A post-larva, 4 mm. in length, from Table Bay (Oct. 1913) is

identifiable as *Upogebia*, but is too badly preserved for detailed description.

This species appears to prefer, as a rule, deeper water than *africana*.

Upogebia africana (Ortmann)

1894. Ortmann, Semon's Austral. Reise, v, p. 22, pl. 2, fig. 4, *a*, *b* (cheliped).

1900. Stebbing, Mar. Invest. S. Afr., i, p. 45 (*capensis*, non Krauss).

1910. *Id.*, *l. c.*, p. 370 (*capensis*, non Krauss).

1928. de Man, *l. c.*, pp. 37, 51.

1947. Barnard, Ann Mag. Nat. Hist. (xi), 13, p. 380.

Differs from *capensis* only in its smaller size, and the absence of the coxal spines and the spine near upper apex of 4th joint of cheliped. The granules on outer surface of hand of cheliped near the thumb are more distinctly spiniform, and 1 or 2 or 3 of them are definitely enlarged, especially in ♂. A spine on upper apex of 4th joint of 2nd leg, or on 2nd joint of ant. 2, is never present, and the lateral lobe of epistome is less distinctly quadrate. The 4th joint of cheliped is less strongly convex along upper margin.

Length up to 65 mm., smallest specimen examined 14 mm., smallest ovig. ♀ 27 mm. Pale yellowish or brownish, eggs yellowish.

Localities.—Port Elizabeth (Ortmann) and Zwartkops River estuary, Algoa Bay (Stebbing); Gordon's Bay, east side of False Bay (Stebbing); Somerset Strand and Gordon's Bay, estuary of the Breede River (Port Beaufort), Knysna lagoon, Keurbooms River estuary (Plettenberg Bay), Zwartkops estuary, Nahoon River estuary (East London), Port St. Johns and Durban Bay (S. Afr. Mus.).

Remarks.—de Man's (1928, p. 51) criticism of Ortmann's description does not seem justified; Ortmann describes one spine at base of thumb and one near base of finger, which is in agreement with his figure, and is perfectly correct.

Although opinions may differ as to whether this form should be regarded as merely a variety of *capensis*, the two forms appear to be localized, one in the colder water, the other in the warmer water; and they should be kept separate in order to work out in detail their distribution.

This form appears to be more strictly estuarine in habitat than *capensis*, though the species which Dr. Gilchrist informed Stebbing (1900, p. 46, and 1910, p. 370) was abundant in "vleis" (lagoons) is more likely to have been *Callianassa kraussi*.

A single ♂, 35 mm. in length, from Durban Bay, although without the coxal spines, has the spine on the 4th joint of cheliped. It also has one of the spiniform granules near base of thumb on outer surface enlarged. It would seem, therefore, that the decisive specific or diagnostic character separating the two forms is the presence or absence of the coxal spines.

A ♀ of a Bopyrid parasite, *Pseudione* species, was found in the branchial chamber of a specimen from Gordon's Bay, but in too poor condition for specific identification.

Upogebia assisi Brnrd.

Fig. 97, *a–d.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 381.

Front scarcely tridentate, the lateral lobes scarcely projecting beyond base of rostrum, which is shorter than its basal width, with 8 tubercles on its rounded margin, and a slight medio-dorsal groove, no tooth on lower surface. Carapace anteriorly with scattered granules, with tufts of setae; lateral ridge tuberculate; cervical groove deeply incised laterally; no spinule on antero-lateral margin above ant. 2. Eyes well pigmented. Acicle distinct, ending in a single spine. Cheliped robust compared with size of animal, upper margin of 4th joint with a minute adpressed spinule near apex, lower margin without spines, 5th joint with a small spine on lower apex and a smaller one on upper apex, 6th joint smooth, without spines, granules, or dorsal grooves; thumb denticulate on inner margin proximally; finger with one or two blunt denticles basally and a broad low tooth or swelling just beyond middle, upper margin distally with 4–5 long low lobes or crenulations. 4th joint of 2nd leg without spinule on upper margin, 5th joint with tooth on lower apex. Dactyl of 3rd and 4th legs slender, tapering, rather abruptly narrowed in distal third, outer margin with several blunt tubercles, inner margin (except the distal third) pectinate. The thumb-like projection of 6th joint of 5th leg rather slender, ending in a stout blunt spine, dactyl elongate, spoon-shaped, unguis small but distinct, outer margin (see under *capensis*) serrulate. No gill on base of 5th leg. Telson broader than long, hind margin rounded-truncate, very slightly less than basal width. Both rami of uropod broadly subtriangular. Eggs small and numerous, ·5 mm. diameter, relatively larger than in *capensis* and *africana.*

Length (ovig. ♀) 16 mm.

Locality.—St. Francis Bay (S. Afr. Mus.).

Remarks.—Described from a single ovigerous ♀ returned unidentified by Stebbing, and appendages of another specimen mounted on a slide by Stebbing.

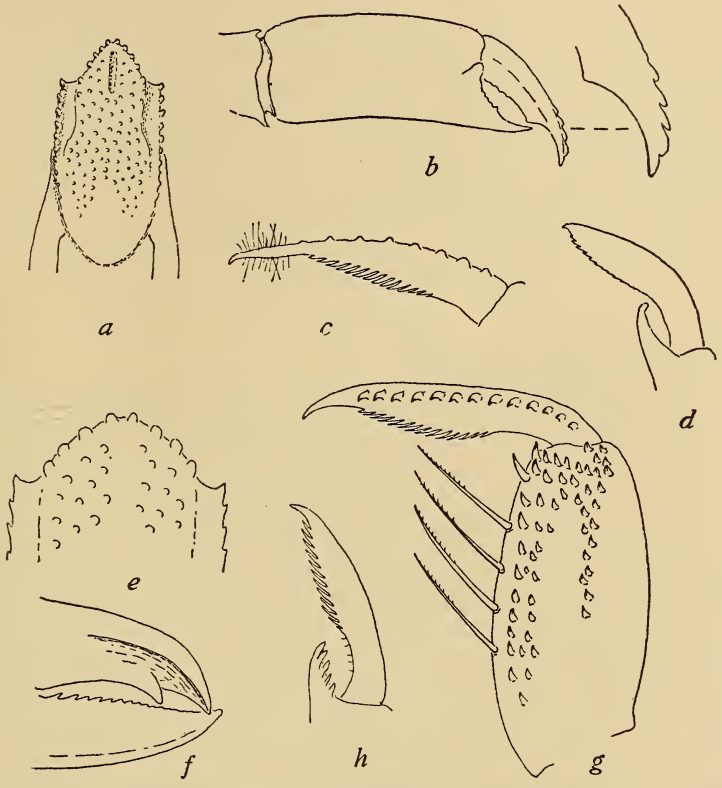


Fig. 97.—*Upogebia assisi* Brnrd. *a*, anterior part of carapace. *b*, outer side of hand of chela, setae omitted, with apex of finger further enlarged. *c*, dactyl of 3rd (and 4th) leg, only apical setae shown. *d*, apex of 6th joint and dactyl of 5th leg, setae omitted.

Upogebia (*Calliadne*) *savignyi* Strahl. *e*, front of carapace. *f*, inner view of apices of finger and thumb of chela. *g*, 6th joint and dactyl of 3rd (and 4th) leg, setae omitted. *h*, apex of 6th joint and dactyl of 5th leg, setae omitted.

Apparently resembles *balssi* de Man 1927 (Red Sea), which has 4 *sharp teeth* on upper distal margin of finger of cheliped. It agrees with *osiridis* Nobili (Red Sea) in having no spinules on antero-lateral border of carapace; thus being one of the species which are intermediate between *Upogebia* s.s. and *Calliadne*.

Subgen. *Calliadne* Strahl

1910. Stebbing, *l. c.*, p. 370.

1928. de Man, *l. c.*, pp. 35, 47 (key to species).

Stebbing regarded it as a matter of personal opinion whether *Calliadne* be given separate generic rank. The distinction (antero-lateral border of carapace without spine, and finger and thumb of cheliped subequal) from *Upogebia* s.s. breaks down, as remarked under the last species, in *osiridis* and *assisi*. And the eggs of the last species are, relatively to the size of the animal, intermediate between those of *capensis* and the very large eggs of *savignyi*.

Most species of *Calliadne* are found in sponges.

Upogebia (*Calliadne*) *savignyi* Strahl

Fig. 97, *e–h*.

1910. Stebbing, *l. c.*, p. 371.

1921. Tattersall, J. Linn. Soc. Lond., xxxiv, p. 395.

1927. de Man, *l. c.*, p. 5, pl. 1, fig. 1 (rostrum).

1928. *Id.*, *l. c.*, pp. 37, 47 (in key).

1937. Gurney, *l. c.*, p. 98, pls. 5, 6 (larval stages).

Rostrum broadly rounded, projecting very slightly, if at all, beyond the level of eyes, with 8–10 granules around margin, separated by a rather wide smooth groove from the lateral serrulate ridges, which project only slightly in front. Dorsal surface of rostrum and carapace anteriorly setose and rather sparsely granulate; no spinule on antero-lateral margin above ant. 2; no spinules on hind margin of cervical groove. Eyes well pigmented. Acicle not distinct. Cheliped robust, lower margin of 4th joint with 5–6 denticles, sometimes obscure, no denticle on upper apex, 5th joint with a small spine on upper and lower apex, 6th joint smooth, upper and lower margins rounded, unarmed, thumb serrulate on inner margin, finger curved, crossing on inside of apex of thumb, its inner surface concave, with tooth on inner margin near middle or nearer the apex. 4th joint of 2nd leg without spinule on upper apex, 5th joint with spine on lower apex. 6th joint of 3rd and 4th legs with 2 bands of strong conical tubercles on outer surface, one near middle and one near lower margin, lower margin with 4 elongate serrulate spine-setae (in addition to other setae), dactyl with a row of strong more or less uncinate tubercles, lower margin pectinate. Thumb-like process of 6th joint of 5th leg with large apical spine and 4 graduated spines, dactyl with lower margin (*in situ*: the

front margin) pectinate. No gill at base of 5th leg. Telson slightly broader than long, not widening distally, hind margin rounded-truncate. Both rami of uropod subtriangular. Eggs large, 1·5–1·75 mm. diameter.

Length 18–19 mm.

Localities.—Off East London (Stebbing); Plettenberg Bay (identified but not recorded by Stebbing), and further specimens from galleries in sponges off East London, 20–50 fathoms (S. Afr. Mus.).

Distribution.—Red Sea.

Remarks.—The Plettenberg Bay specimens do not show the denticles on lower margin of 4th joint of cheliped, and the tooth on the finger is nearer the apex than it is in the East London specimens.

The Bopyrid parasite *Aporobopyroides upogebiae* Nobili 1906 has been recorded in Red Sea examples.

Upogebia (*Calliadne*), cf. *rhadames* Nob.

1904. Nobili, Bull. Mus. d'Hist. Nat. Paris, no. 5, p. 235.
1906. *Id.*, Ann. Sci. Nat. (9), iv, p. 100.
1927. de Man, *l. c.*, p. 6, fig. 2 (rostrum).
1928. *Id.*, *l. c.*, p. 47 (in key).
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 381.

Rostrum triangular, projecting only slightly beyond eyes, with 5 sharp tubercles on each margin, considerably larger than the granules on dorsal surface, separated by a moderately wide groove from the rather strongly serrate lateral ridges of carapace, the anterior tooth of which is prominent. No spinule on antero-lateral border of carapace; no denticles on cervical groove. Eyes well pigmented. Acicle minute. Cheliped stout, 4th joint denticulate on lower border, 2–4 spines on upper border near apex, 5th with median tooth on lower apex and 2–3 denticles external to it, 6th joint denticulate on lower and on upper margins, the denticles on latter increasing in size distally, cutting-edge of thumb smooth, finger with 2 denticles on upper margin near hinge (more distinct in ♂ than ♀), cutting-edge with tooth near base on inner surface. 2nd leg with tooth on lower apex of 5th joint, lower basal corner of 6th joint distinctly quadrate. 6th joint of 3rd and 4th legs with strong conical tubercles near inner distal apex and near distal half of inner margin, dactyl with a row of strong uncinate tubercles (much larger than in *savignyi*), inner margin pectinate. Thumb-like process of 6th joint of 5th leg with numerous spines on its margin, dactyl pectinate. No gill at base of 5th leg.

Telson about as broad as long, distal margin slightly less than basal width, rounded-truncate. Both rami of uropod broadly subtriangular. Eggs rather numerous, 1 mm. diameter.

Length up to 36 mm. (ovig. ♀). Pale pink.

Locality.—Natal coast, in sponges washed up on beach (S. Afr. Mus.).

Distribution.—Red Sea.

ASTACURA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 473, 475.

1917. Bouvier, Res. Sci. Camp. Monaco, fasc. 50, p. 9 (*Homaridae*).

Carapace free from epistome; posterior margin not gripped by processes of 1st abdominal segment. Rostrum well developed. Body cylindrical. Inner lobes of mx. 2 and mxp. 1 not reduced. First 3 pairs of legs chelate, or (in *Enoplometopus*) only first 2 pairs. No appendix interna on pleopods. Outer ramus of uropod divided by a suture (except *Nephropsis suhmi*).

No *Zoea*-stage; the larvae of the marine forms hatch in the Schizopod (Mysis) stage, with natatory exopods on the legs. The Freshwater Crayfishes have a direct development, the young immediately on hatching being almost exactly like the adults.

Remarks.—The Northern Freshwater Crayfishes, *Potamobiidae*, are palaearctic; the Southern Freshwater Crayfishes, *Parastacidae*, are found in Australasia, South America, and Madagascar. The Cape representatives belong to the marine family *Astacidae*.

Family ASTACIDAE.

Lobsters, Norway Lobsters, Homards (Fr.).

1910. Stebbing, *l. c.*, p. 378.

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, p. 95 (*Nephropsidae*).

1917. Bouvier, *l. c.*, pp. 12–24 (*Homaridae*).

1933. Balss, Mitt. Zool. Mus. Berlin, xix, p. 86 (*Homaridae*).

Last thoracic segment fixed, fused with the preceding segment. Legs 7-jointed, but in the enlarged 1st pair no independent motion between 2nd and 3rd joints. Large foliaceous epipods on first 4 pairs of legs independent of the podobranchs; 4 pleurobranchs. Pleopod 1 uniramous, weak in ♀, but strong, rigid, and more or less channelled in ♂ (without coupling-hooks); pleopod 2 ♂ with rigid appendix masculina; pleopods 2–5 biramous.

Key to the South African Genera.

1. First 3 pairs of legs chelate.
   - *a*. Antennal scale present, more or less foliaceous. Eyes pigmented (figs. 98, 99, *a*).
     - i. Antero-lateral angle of carapace not sharply projecting (*i.e.* no outer orbital spine) . . *Astacus.*
     - ii. Antero-lateral angle of carapace sharply projecting . . . . . *Nephrops.*
   - *b*. Antennal scale absent. Eyes feeble, not pigmented (fig. 99, *b*) . . . . . *Nephropsis.*
2. First 2 pairs of legs chelate . . . . . *Enoplometopus.*

Gen. Astacus Borlase

1758. Borlase, Nat. Hist. Cornwall, p. 274.

1760. Gronovius, Acta Helv., iv, p. 23.

1795. Weber, Nomencl. Ent. Fabric., p. 94 (*Homarus*).

1813–14. Leach, Edin. Encycl., vii, p. 398.

1900. Stebbing, Mar. Invest. S. Afr., i, p. 33 (references).

1910. *Id.*, *l. c.*, p. 378 (with reference to Borlase).

1911. Herrick, Bull. U.S. Bur. Fish., xxix, 1909, pp. 149–408, text-figs. and pls. 28–47 (Nat. Hist. Amer. Lobster, *Homarus*).

1928. Opinion 104. Intern. Comm. Nomencl., Smiths. Misc. Coll., lxxiii, 5, pp. 25, 27 (*Homarus*).

Carapace compact, subcylindrical, cervical groove distinct, antero-lateral angles (outer orbital angles) not prominent. First pair of legs large, sometimes very robust, with strong chelae (pincers).

Remarks.—Three species of marine Lobsters are known: the European *gammarus* (*marinus* or *vulgaris*), the American *americanus*, and the Cape species.

In Opinion 104 the Rule of Priority was suspended and *Astacus* and *Homarus* placed in the official list of generic names: *Astacus* Pallas 1772 * for the river crayfish (*Potamobius*), and *Homarus* Fabr. for the marine lobster. It is thus proposed to condone and "officially" recognize a century of injustice done not only to Leach but to the still earlier author Borlase.

The reason given for this is to avoid confusion. But the confusion for the most part is due to the writers of text-books, who usually are not taxonomists, and who lag behind the advances of taxonomy. In

* Not quoted in Sherborne's Index Anim., 1902 ; Prussian Academy's Nomencl., i, 2, 1926; nor in Neave's Nomencl., i, 1939 !

deference to these writers, taxonomists have to suspend their own Rules! Is there any reason why some future "International" Commission should not review and rescind Opinion 104, for surely the Rule of Priority is more fundamental than the opinion of eleven of the eighteen members of the temporary personnel of a Commission?

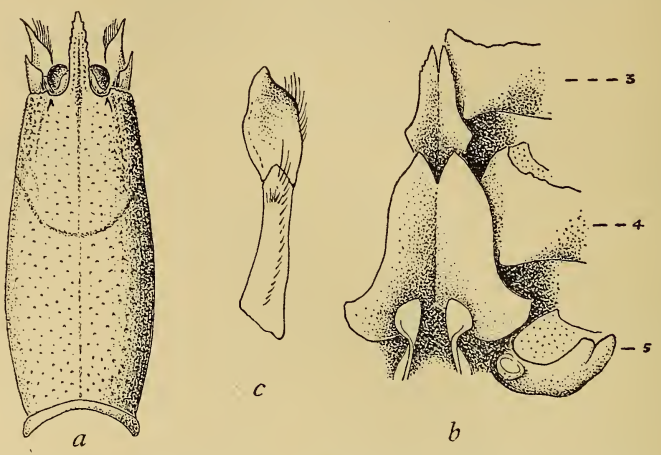


Fig. 98.—*Astacus capensis* Herbst. *a*, carapace. *b*, sternal plates, 3rd–5th coxae, and apices of 1st pleopods ♂. *c*, inner (median) view of left 1st pleopod ♂.

Astacus capensis Herbst

Cape Lobster.

Fig. 98.

1900. Stebbing, *l. c.*, p. 34, and p. 237 (corrigenda).
1902. *Id.*, Mar. Invest. S. Afr., ii, p. 83 (corrigenda repeated).
1910. *Id.*, *l. c.*, p. 378.
1912. Herrick, Science, New York, xxxvi, p. 58 (*Homarus c.*).
1918. Gilchrist, Mar. Biol. Rep., iv, p. 44, fig. (*Homarus c.*).
1918. Barnard in Gilchrist, *ibid.*, p. 48 (*Homarus c.*).
1946. Holthuis, Dec. Macrura Snellius Exp. Temminckia, vii, p. 87 (*Homarus c.*).

Carapace smooth and pitted dorsally, granulate laterally, with scattered setae (obsolete in largest specimen); rostrum dorso-ventrally flattened, no ventral tooth, apex subacute, lateral costate margin with 5–10 serrations, hinder ones very feeble, dorsal surface granulate between costate margins and the median groove; a small post-orbital tooth. Abdomen pitted, with scattered setae, mainly on hinder

segments; telson squamosely sculptured, with numerous setae; a small medio-ventral denticle on segments 2–5 in ♂ (not on 5th segment in largest specimen) and a series of 6–8 denticles on hind margin of 6th sternum. Chelipeds subequal, or one of them slightly the larger, 4th joint granulate and furry below, 5th joint squamose-granulose and hairy, 6th joint with outer margin finely, inner margin strongly, serrate (outer serrations obsolete in largest specimen), lower surface squamose-granulose, chiefly near the margins, and becoming obsolete in largest specimen, upper surface including base of thumb furry, but feebly so in largest specimen; opposed margins of finger and thumb thickly furry in smaller, less so in larger, chela. 5th leg with tuft of setae at apex of 6th joint.

Length ♂ up to 102 mm., carapace 47 mm., cheliped 82 mm. Dark olivaceous (*fide* Gilchrist).

Localities.—Table Bay, Algoa Bay (Stebbing, and S. Afr. Mus.); washed up on beach at Gt. Fish Point (Bathurst Division) (Albany Mus.).

Remarks.—In the register book (in the handwriting of the late Dr. W. F. Purcell) the South African Museum is said to have had a ♂ from Port Elizabeth (no. 1315), a ♀ from Table Bay (no. 1430), and a ♂ and ♀ from Table Bay (no. 1431). The Port Elizabeth ♂ is the largest specimen, referred to above; no. 1430 is a small ♂, and no. 1431 are both ♂♂. In addition there is a ♂ found on Sea Point beach (Table Bay) in July 1936. The Gt. Fish Point specimen, belonging to the Albany Museum, Grahamstown, is also a ♂. I have seen no ♀. According to information received from Dr. Gordon, Stebbing's ♂ specimen is in the British Museum, but not the ♀.

Gen. Nephrops Leach

1813–14. Leach, Edin. Encycl., vii, pp. 398, 400.

1901. Alcock, Ind. Deep-sea Crust., p. 153.

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, pp. 96, 97 (key to Indo-Pacific species).

1925. Balss, D. Tiefsee Exp., xx, p. 207 (distribution of species).

1938. Gurney, "Discovery" Rep., xvii, p. 294 (larva, sed?).

Carapace more or less laterally compressed, cervical groove distinct, antero-lateral angles prominent and sharp. Eyes large. Antennal scale foliaceous. 1st pair of legs longer and stouter than the other legs, but not heavy and robust, nearly symmetrical. Gills 20 plus

7 epipods (Alcock), but Bouvier (1917, p. 19) gives 19 for *N. norwegicus*, the podobranch on mxp. 2 being absent as in *Nephropsis*.

Remarks.—*N. norwegicus*, the Norway Lobster, is found in the N. Atlantic and Mediterranean; there is one species in Brazilian waters, and the other six species (de Man, 1916) are Indo-Pacific.

Nephrops andamanica Wood-Mason

Fig. 99, *a*.

1894. Wood-Mason, Ann. Mag. Nat. Hist. (6), xiii, p. 226.

1892. *Id.*, Illustr. Zool., R.I.M.S. "Investigator," pl. 4, and 1894. *Ibid.*, pl. 8, fig. 5.

1901. Alcock, *l. c.*, p. 153 (*thomsoni* var. *a.*).

1916. de Man, *l. c.*, p. 99, pl. 3, fig. 15.

1925. Calman, Fish. Mar. Biol. Surv., iv, Spec. Rep. 3, p. 22.

1925. Balss, *l. c.*, p. 207.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 127.

Carapace smooth, finely pubescent; rostrum with 1 tooth on each lateral margin and 1 median tooth ventrally; submedian keels each with 3 teeth; behind cervical groove 2 small teeth followed by an irregularly double row of denticles, 3 lateral keels (excl. lower costate margin of carapace) each ending in front in a small denticle. Abdominal segments distinctly sculptured, transverse groove on segment 1 uninterrupted, on segments 2–4 interrupted, the grooves and depressed areas pilose; segment 6 with a spine in middle of lateral margin and a median one on hind margin; telson with a pair of spines proximally, and one at each postero-lateral corner. Chelipeds with 6th joint strongly fluted, the prominent keels serrate or squamose-tuberculate.

Length of carapace incl. rostrum up to ♀ 81 mm. Pinkish or reddish, eggs sky-blue (Balss).

Localities.—Natal coast (off Durban), 220–230 fathoms (Calman); Portuguese East Africa (25° 28′ S., 33° 31′ E.) and off Delagoa Bay, 420 metres and 275 fathoms (Barnard); several localities off Durban and Tongaat River, Natal, 102–460 fathoms (Barnard, *fide* Gilchrist).

Distribution.—Andaman Sea and East Indies.

Remarks.—I have only seen one ♀ (from 25° 28′ S., 33° 31′ E.); the other records given by me in 1926 rested on identifications by the late Dr. Gilchrist.

Gen. Nephropsis Wood-Mason

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 33.

1910. *Id.*, *l. c.*, p. 379.

1916. de Man, *l. c.*, pp. 97, 110 (list of species, key to Indo-Pacific species).

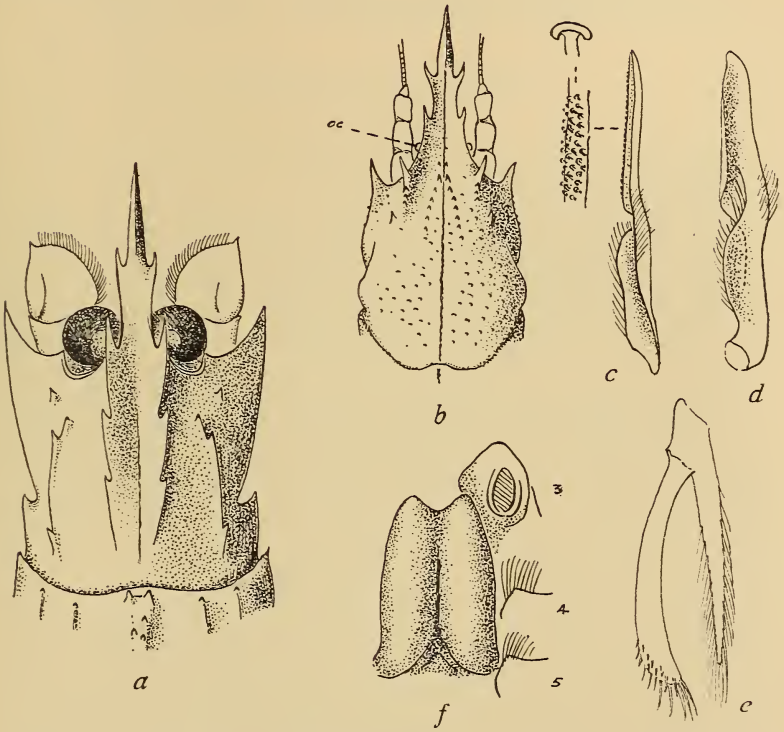


Fig. 99.—*Nephrops andamanica* Wood-Mason. *a*, anterior part of carapace with antennal scales.

Nephropsis atlantica Norman. *b*, anterior part of carapace with eyes (*oc.*) and 2nd antennae. *c*, ventral view of left pleopod 1 ♂ with coupling-hooks further enlarged. *d*, inner (median) view of same. *e*, endopod with appendix masculina of pleopod 2 ♂. *f*, thelycum ♀ and 3rd–5th coxae.

1917. Bouvier, *l. c.*, p. 19 (key to species).

1925. Balss, *l. c.*, p. 208 (distribution of species).

Similar to *Nephrops*, but eyes small, unpigmented, and scarcely differentiated from the eye-stalks; no antennal scale; gills 19 plus 7 epipods, the podobranch on mxp. 2 being absent.

Key to the South African Species.

Outer ramus of uropod with transverse suture in both species.

1. Abdominal segments faintly keeled. A second pair of small spines behind the larger pair at base of rostrum. A spine near middle of anterior border of pleura of 2nd abdominal segment . . . . . *atlantica.*
2. Abdominal segments without any median keel. No second pair of spines behind rostrum . . . *stewarti.*

Nephropsis atlantica Norman

Fig. 99, *b–e.*

1910. Stebbing, *l. c.*, p. 379.

1916. de Man, *l. c.*, p. 112 (in key).

1917. Bouvier, *l. c.*, p. 22, pl. 1, figs. 1–5 (fig. 1 coloured).

1918. Barnard in Gilchrist, Mar. Biol. Rep., iv, p. 48.

1923. Stephensen, Dana Exp. Rep., vii, p. 79.

? 1932. C. von Bonde, Fish. Mar. Biol. Surv. Rep., ix, pp. 59, 61, 63.

Rostrum with usually 2 pairs of lateral teeth, sometimes $2\frac{1}{2}$ or 3, or only $1\frac{1}{2}$ pairs (one being absent from one side or the other). Carapace and chelipeds squamose-granulose, the former finely pilose, the latter tomentose. Abdomen also pilose, but the faint median keel bare. The pair of small spines behind the pair of large ones behind base of rostrum usually distinct, but sometimes obsolescent on one or both sides. 2nd–5th pleurae produced in a sharp spine; anterior margin of 2nd with a denticle (rarely obsolescent), and usually smaller subsidiary denticles (serrations) above it. Coxa of 3rd leg with a hook-like spine projecting backwards, and some denticles nearer the middle line. Pleopod 1 ♂ long, extending forwards between the coxae to the gap between the 1st and 2nd coxae, channelled on its median side, the dorsal edge of the distal half with a series of coupling-hooks; pleopod 1 ♀ slender and feeble. Pleopod 2 ♂ with stout, ensiform appendix masculina, tipped with graduated spines. Eggs large, moderately numerous, 1·5 mm. diameter.

Length of carapace up to ♂ 30 mm., ♀ 33 mm. (total length resp. 68 and 75 mm.). Orange-red.

Localities.—Off Cape Natal (Durban), 440 fathoms (Stebbing, and S. Afr. Mus.); Natal coast, 29° 44′–29° 50′ S. lat., 158–202 fathoms (von Bonde).

Distribution.—N. Atlantic, Arabian Sea.

Remarks.—Stebbing had 4 specimens, and there are 8 others in the South African Museum. I have not seen the specimens identified as this species by von Bonde.

Nephropsis stewarti Wood-Mason

1873. Wood-Mason, J. Asiat. Soc. Bengal, xlii, p. 40, pl. 4.
1896. Alcock, Illustr. Zool. "Investigator," pl. 27, figs. 1, 1, *a*.
1901. *Id.*, *l. c.*, p. 159.
1916. de Man, *l. c.*, p. 112, pl. 3, fig. 17.
1925. Balss, *l. c.*, p. 208.
1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 21.
1938. Ramadan, John Murray Exp., v, p. 124, fig. 1 (spermatheca).

Rostrum with one pair of lateral teeth. Carapace, abdomen, and chelipeds with scattered granules, finely pilose. Abdomen without trace of median keels. A single pair of spines behind base of rostrum; a small median gastric tubercle, and another on hind margin of carapace. No denticle on 2nd abdominal pleura. Coxae of 2nd–4th legs in ♂ tuberculate, 3rd coxa with a hooked spine.

Length (total) up to ♂ 147 mm. (Alcock), ♀ 113 mm. (Calman).

Locality.—Off Natal coast (Durban), 230 fathoms (Calman).

Distribution.—Indian Seas, Kei Islands.

Remarks.—Only a single ♀ has been recorded from South African waters.

Gen. Enoplometopus M. Edw.

1862. Milne Edwards, Ann. Sc. Nat. (4), xvii, p. 362, and in Maillard, Notes sur l'Île de la Réunion, p. 14.
1894. Ortmann, Semon's Austral. Reise, v, p. 21.
1897. *Id.*, Zool. Jahrb. Abt. Syst., x, p. 274.
1916. de Man, *l. c.*, p. 96 (list of species).
1917. Bouvier, *l. c.*, pp. 12–17.
1922. de Man, Siboga Exp. monogr., xxxix*a*, 4, p. 50.
1933. Balss, Mitt. Zool. Mus. Berlin, xix, p. 87.
1938. Gurney, "Discovery" Rep., xvii, pp. 296–299 (larval stages).
1946. Holthuis, Dec. Macrura Snellius Exp. Temminckia, vii, p. 72 (key to species).
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 381.

Carapace compact, somewhat compressed from side to side, cervical groove obsolescent, antero-lateral angles not prominent. Only the first two pairs of legs chelate, 1st pair large, with strong pincers.

1921. de Man, Zool. Med., vi, p. 94.
1922. *Id.*, *l. c.*, pp. 50, 51 (compared with *longirostris*).
1924. *Id.*, Arch. Naturg., xc, p. 57, fig. 20 (thelycum).
1933. Balss, *l. c.*, p. 87.
1934. Barnard, Nature, cxxxiv, p. 665 (occurrence in S. Africa).
1942. Ward, Mauritius Inst. Bull., ii, p. 61 (*pictus*).

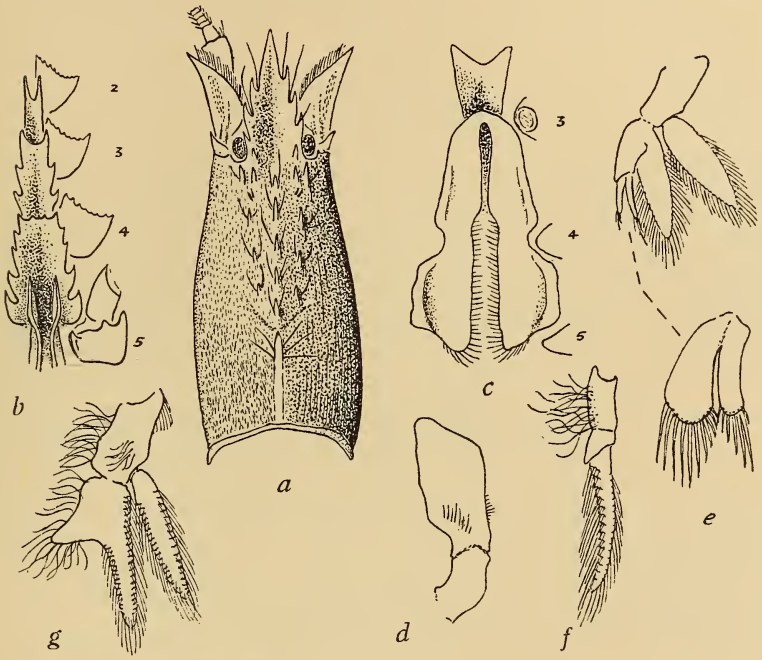


FIG. 100.—*Enoplometopus occidentalis* (Randall). *a*, carapace. *b*, sternal plates, 2nd–5th coxae, and apices of 1st pleopods ♂. *c*, thelycum ♀. *d*, inner (median) view of left 1st pleopod ♂. *e*, anterior view of left 2nd pleopod ♂, with bifid appendix masculina further enlarged (in side view). *f*, 1st pleopod ♀. *g*, 2nd pleopod ♀.

1946. Holthuis, *l. c.*, p. 74, pl. 5, figs. *a*, *c*, *f*, *i*).
1947. Barnard, *l. c.*, p. 382.

Rostrum dorso-ventrally flattened, extending to level of apex (or a trifle beyond) of the lanceolate antennal scale, with 3 (♂) or 4 (♀) lateral teeth (not quite symmetrical), no ventral teeth. Carapace with a medio-dorsal series of 6 spines, only one (the 6th) behind the very inconspicuous cervical groove, a submedian series of 6 spines, the 1st near inner orbital margin, the 3rd inconspicuous, especially in ♂, the last in front of cervical groove, a post-ocular spine; associated

with all these spines and the rostral teeth are long stiff bristles, either singly, or in twos and threes, or in tufts of bristles of unequal length. Occasional bristles scattered over carapace, which is densely pilose except on the spines, the median line behind last median spine, and the costate hind margin. Terga of abdominal segments (except 1st), inner ramus of uropod, and telson with long stiff bristles, arising from low adpressed squamae. Hind margin of 6th abdominal segment transverse, without projecting spines. Telson subquadrangular, apical margin truncate, only slightly convex. Pleura of abdominal segment 1 rounded, concealed by the enlarged and forwardly produced pleura of segment 2, pleurae of segments 3–6 rounded-quadrate. No denticle on margin of any of the pleurae. Telson with a spine on middle of lateral margin, and 2–3 unequal-sized spines at end of lateral margin. Terga and pleurae pilose, but the margins, a medio-dorsal stripe and the squamae bare. Sternal plates of ♂ laterally spinose. 2nd joint of antennal peduncle with spine on lower border external to opening of gland. Chelipeds in ♀ equal; a double row of 6–7 spines on upper margin of 4th joint, proximally only a single row of 3–4, a single row on each of lower margins; outer and inner margins of hand spinose, a series of spines along middle of hand on both upper and lower surfaces, opposed margins of finger and thumb with numerous rather small teeth, more or less equal, but 2–3 near base of finger rather larger, whole of outer margin of finger spinose; all joints pilose (except near median row of spines on lower surface of hand) and with long bristle-hairs, the latter especially numerous on the hand, finger, and thumb. Pleopod 1 ♂ a strong cultrate plate set dorso-ventrally parallel with its fellow; the bifid appendix masculina on pleopod 2 ♂ also set in the same plane, at right angles to the endopod and exopod. Distal margin of tail-fan with thick fringe of plumose spine-setae.

Length ♀ 145 mm., carapace 66 mm.; ♂ 96 mm. and 38 mm. resp.; length of hand to end of thumb ♀ 58 mm., finger 25 mm. Pale-coloured spots across abdominal segments, a white bar across the 6th medio-dorsal spine on carapace, 2nd–5th legs with narrow pale rings on 4th joints.

Localities.—Natal coast, 1 ♂ from stomach of fish (S. Afr. Mus.); Isipingo, Natal, 1 ♀ (Durban Mus.).

Distribution.—Hawaiian Is., East Indies, Réunion, Mauritius.

Remarks.—According to Bouvier (1915, *l. c.*) the specimens referred to *pictus* by Miers, de Man, and Ortmann are really *occidentalis*. The true *pictus* M. Edw. from Réunion has no post-cervical spine.

I have seen the dried ♀ ex Durban Museum, and a ♂ taken from a fish stomach, the latter lacking both chelipeds and some of the other legs. In the latter I have attempted to check the gill-formula, but the gills are very much matted together and not in perfect condition. The formula appears, however, to correspond with that of the Lobster and *Nephrops*, *i.e.* 6 podobranchs plus 7 epipods, 10 arthrobranchs and 4 pleurobranchs = 20 + 7 epipods.

PALINURA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 473, 474.

Carapace fused at sides to epistome; hind margin gripped by processes of 1st abdominal segment. Rostrum small or wanting (except *Palinurellus*). Body often depressed. Inner lobes of mx. 2 and mxp. 1 reduced. Appendix interna on some of the pleopods, at least in ♀. Outer ramus of uropod without sharp suture.

Key to the Families.

1. All legs 6-jointed, none of them much larger than the others; none of them, except the last pair in ♀, chelate.* Telson more or less truncate (*Scyllaridea*).
   - *a*. Carapace subcylindrical. Eyes not enclosed in orbits (figs. 101, 102, *i*). Ant. 2 with long whip-like flagellum . . . . . *Palinuridae.*
   - *b*. Carapace depressed. Eyes in orbits. Ant. 2 short, flattened, without whip-like flagellum (fig. 104, *c*, *e*) *Scyllaridae.*

2. All legs 7-jointed, and all, except sometimes the last (5th), chelate; the 1st pair much longer than the others. Eyes rudimentary, eye-stalks immovable (fig. 105, *a*). Telson pointed (*Eryonidea*) . . . . . *Eryonidae.*

Family Palinuridae.

Crayfishes,† *Spiny Lobsters*, *Langoustes* (Fr.).

1911. Gruvel, Ann. Inst. ocean. Paris, iii, fasc. 4, pp. 5 *sqq.* (anatomy, systematics, etc.).‡

* *Palinurus longimanus* has the 1st pair feebly chelate.

† "Crayfish" is derived from écrevisse, the French name for the European River Crayfish (*Potamobius*). By corruption "Crayfish" has become "Crawfish," which is often (in South Africa usually) applied to the marine forms.

‡ This paper mentions neither *J. parkeri* nor *P. gilchristi*. It is useful, but, from a taxonomic point of view, inadequate.

1911. *Id.*, Rev. Zool. Afr., i, p. 141 (West African).

1913. Bouvier, Trans. 2nd Intern. Congr. Entomol., Oxford, ii, p. 78 (*Puerulus* stage).

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, pp. 31 *sqq.*

1918. Barnard in Gilchrist, Mar. Biol. Rep., iv, p. 49.

1936. Gurney, "Discovery" Rep., xii, p. 400 (*Phyllosoma* stage).

1946. Holthuis, Dec. Macrura Snellius Exp. Temminckia, vii, p. 109 (key to genera).

Carapace more or less cylindrical, gripped between a dorsal lobe of 1st abdominal segment overlapping hind margin externally, and an internal knob on the side of last thoracic segment. The true 2nd and 3rd joints of legs are fused, so that there appear to be only 6 joints in all. No appendages on 1st abdominal segment (except *Palinurellus*); 2nd–5th pleopods (*i.e.* the appendages of 2nd–5th segments) in ♂ uniramous,* lamellate; in ♀ biramous, endopod of 2nd pleopod usually broadly lamellate like the exopod (exceptions: *Linuparus* and *Puerulus*†), but not lamellate in 3rd–5th pleopods, and with appendix interna. A small chela on 5th leg in ♀.

Development.—The eggs after extrusion are carried attached to the pleopods of the female. In *Jasus lalandii* the first larval stage is a *Naupliosoma* (Gilchrist, 1913) which develops into a *Phyllosoma*, which is the typical form of larva in the *Palinuridae*. It is flattened, leaf-like, transparent, and pelagic (see *infra*). Several such stages are passed through before the cylindrical adult shape is assumed, the first of these latter stages having been called the *Puerulus*-stage or Natant-stage.

Remarks.—The stridulating organ consists of a striate area and a polished knob on the under surface of a projection on the inner margin of 3rd peduncular joint of the 2nd antenna, sometimes with a band of setae anteriorly (fig. 102, *c*), and posteriorly adjoining the fleshy pad which continues into the membranous articulation at base of 3rd joint; this slides over the smooth and thickened lateral edges of the antennular plate (see also *Challenger* Rep., xxiv, pl. 10A, fig. C).

* Hale (S. Austral. Crust., pt. 1, fig. 65, *a*, 1927) shows a short rod-like endopod on the "1st" (*i.e.* 2nd) pleopod in ♂ of *J. lalandii*. See also Holthuis, *l. c.*, p. 115.

† See Calman, 1909, Ann. Mag. Nat. Hist. (8), iii, p. 442.

Key to the South African [Mauritian] Genera.

I. Rostrum small or wanting.
  A. No stridulating organ. A small pointed rostrum clasped by lateral processes and separating the eye-stalks medianly (fig. 101, *a*). Flagella of ant. 1 short. Bases of ant. 2 close together (*Silentes*) . . . . . *Jasus.*
  B. Stridulating organ present. Rostrum absent, bases of eye-stalks exposed (*Stridentes*).
    1. Antennular plate narrow, unarmed (figs. 101, *c*, 102, *a*). Bases of ant. 2 close together, hiding bases of ant. 1, flagella of latter short.
      a. Frontal processes obliquely flattened, acute, rather large (fig. 101, *c*). 1st peduncular joint of ant. 1 not extending to end of peduncle of ant. 2 . . . *Palinurus.*
      b. Frontal processes horizontally flattened, blunt, short (fig. 102, *a*). 1st peduncular joint of ant. 1 extending beyond apex of peduncle of ant. 2 . . *Palinustus.*
      c. Frontal processes fused. Flagellum ant. 2 stout, shorter than length of animal . *Linuparus.* (See Addenda.)
    2. Antennular plate broad, spinose (fig. 102, *c*, *e*, *f*). Bases of ant. 2 rather far apart, not hiding bases of ant. 1, flagella of latter long . . *Panulirus.*
II. A well-developed triangular rostrum. Carapace and abdomen dorsally pitted . . . [*Palinurellus*, Mauritius].

Gen. Jasus Parker

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 38.

1910. *Id.*, *l. c.*, p. 374.

1911. Gruvel, *l. c.*, p. 10.

1946. Hickman, Proc. Roy. Soc. Tasman. for 1945, pp. 27, 57 (biology, abnormal reproductive organs).

See key. 2nd peduncular joint of ant. 1 shorter than 3rd (adult).*

* Willem von Bonde (1930, Fish. Mar. Biol. Surv. Rep., viii, Spec. Rep., 1, p. 9) claims that the peduncular joints of the 1st antenna show a constant ratio, in the *Phyllosoma*, *Puerulus*, and adult, in three South African genera. I cannot confirm this. *Jasus* and *Palinurus* (and *Palinustus*) agree in having the 2nd joint shorter than the 3rd; *Panulirus* has the 3rd a little shorter than the 2nd. But the actual ratios given by von Bonde for *Jasus* and *Palinurus* are not constant in the adult, and the two genera cannot be separated by their 1st antennae alone.

Endopod of 3rd–5th pleopods ♀ oblong, not produced (or only slightly) on its outer apex. Appendix interna on pleopod 2 ♀ present but small. The chela on 5th leg ♀ formed by the 7th joint (dactyl) impinging against a spiniform projection of the 6th joint (fig. 101, *b*); this process may be slightly flexible, but is not articulated with the 6th joint (Hale (1927, *l. c.*, p. 69) seems to suggest in his text and fig. 65, *c*, that it is articulated). Coxal joint of 5th leg ♂ not enlarged; vas deferens opening on a tubercle with the orifice guarded by a small trap-door-like flap *within* the rim of the tubercle.

Remarks.—The genus is confined to the Southern Hemisphere.

Key to the South African Species.

1. Frontal processes parallel. Cervical groove distinct. Abdomen squamose . . . . . *lalandii.*
2. Frontal processes diverging. Cervical groove obsolete. Abdomen with a median keel on first 5 segments, otherwise smooth . . . . . *parkeri.*

Jasus lalandii (Lam., M. Edw.)

Cape Crayfish; Kreef.

Fig. 101, *a*, *b*.

1910. Stebbing, *l. c.*, p. 374.

1913. Gilchrist, Mar. Biol. Rep., i, pp. 25 *sqq.* (distribution, sex differences, etc.).

1913. *Id.*, J. Linn. Soc. Lond., xxxii, p. 225, fig. (*Naupliosoma* stage).

1914. Lenz and Strunck, D. Sudpol Exp., xv, p. 292.

1916. Balss, Beitr. Meeresf. Westafr., ii, p. 31.

1916 (Oct.). Archey, Trans. New Zeal. Inst., xlviii, p. 398, figs. 1–6, *a*, and pl. 29, fig. 3.

1916 (Nov.). Gilchrist, J. Linn. Soc. Lond., xxxiii, p. 101, 12 text-figs., and pls. 12–17 (larval and post-larval stages).

1918. *Id.*, Mar. Biol. Rep., iv, p. 46, fig., and Barnard, *ibid.*, p. 49.

1920. *Id.*, J. Linn. Soc. Lond., xxxiv, p. 189, text-figs. 1–13 and pls. 15, 16 (post-*Puerulus* stage).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 24.

1924. Balss in Skottsberg, Nat. Hist. Juan Fernandez and Easter Is., iii, p. 333 (date *apud* Zool. Rec. 1929).

1927. Hale, S. Austral. Crust., pt. 1, p. 65, figs. 62, 65–67.

1935. Cecil von Bonde and Marchand, Fish. Mar. Biol. Surv., Fisheries Bull., i, pp. 8–25, pls. 1–8 (anatomy, development, etc., maps 1–9 fishing grounds).

1936. Gurney, "Discovery" Rep., xii, pp. 416–425, figs. 28, 29 (*Phyllosoma*).

1936. Cecil von Bonde, Fish. Mar. Biol. Surv., Investigat. Rep., 6, pp. 5–25, pls. 1–12 (embryology, development).

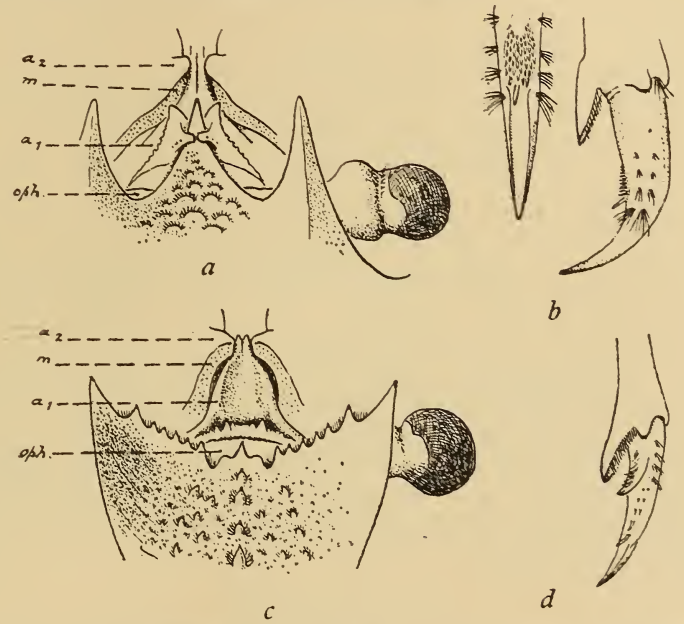


Fig. 101.—*Jasus lalandii* (Lam., M. Edw.). *a*, frontal area, showing base of antenna 2 (a_2), membranous articulation (m), antennular segment (a_1) and base of eye-stalk (*oph.*). *b*, apex of 6th joint and dactyl of 5th leg ♀, with inner view of dactyl.

Palinurus gilchristi Stebb. *c*, frontal region, as in *a*, but *oph.* here indicates the ophthalmic segment. *d*, apex of 6th joint and dactyl of 5th leg ♀.

1938. *Id.*, Cape Naturalist, vol. 1, no. 5, pp. 143–154, figs. 1–5 (popular account).

1942. Gurney, Larvae Decap. Crust. Ray Soc., no. 129, p. 97 (distribution).

1946. Holthuis, *l. c.*, p. 146 (references).

[Papers dealing exclusively with economic aspects not quoted.]

Carapace with flattened squamose tubercles of various sizes, each sharp pointed and with a fringe of setae around base. Abdomen with rounded squamae, also fringed with setae, the penultimate transverse

row better developed than the others, so that a more or less conspicuous groove is formed between it and the hindmost row.

Length up to 460 mm. (18 inches) (510 mm. = 20 inches: Australia). Reddish brown, often with purplish or violescent tints in places, especially on tail-fan, under surface dull yellowish, flagellum of antennae often with pale bands.

Localities.—From Cape Cross (north of Walfish Bay) to Cape Point, occasional specimens from False Bay and Agulhas Bank (*e.g.* Odhner, 1923) as far east as Algoa Bay, 0–25 fathoms.

Distribution.—Chile (Balss, 1924, says not Chile), Juan Fernandez, Tristan d'Acunha, St. Paul Is. (southern Indian Ocean), southern Australia, Tasmania, New Zealand.

Remarks.—The Cape Crayfish is the only Crustacean which is of any real economic importance in South Africa. The economic aspects are dealt with in various reports of the Cape Government Biologist (1896–1906), Marine Biological Reports (1913–1918, Administration of the Cape Province), and the Fisheries and Marine Biological Survey Reports (1921→, Union of S. Afr.).

The distribution is subantarctic, the cold Humboldt current permitting its extension to Juan Fernandez. According to Parker (1887) there are constant differences between the New Zealand form (var. *edwardsii* Hutton 1875) and the typical Cape form. The Australasian *verreauxi* (M. Edw.) 1851 differs in having only a few scattered nodules and no transverse grooves on the abdominal segments (*cf.* Gruvel, 1911, *l. c.*, pl. 3, fig. 1).

Jasus parkeri Stebb.

Parker's Crayfish.

1902. Stebbing, Mar. Invest. S. Afr., ii, p. 39, pl. 7.

1910. *Id.*, *l. c.*, p. 375.

1946. Holthuis, *l. c.*, pp. 110, 148.

Carapace smooth, with a submedian and a lateral longitudinal series of spines on either side. Abdomen smooth, a median keel on segments 1–5, and a few spines on segment 6. Chela on 5th leg ♀ as in *lalandii*.

Length ♂ up to 134 mm., ♀ 152 mm. Orange or orange-red (as preserved), flagella of 1st antenna, 5th and 6th joints of legs, and membranous part of tail-fan pale.

Locality.—Off East London, 250–310 fathoms (Stebbing, and S. Afr. Mus.).

Remarks.—Larger specimens agree with Stebbing's description, and

the ♀ is like the ♂ (except for usual sexual differences). The submedian spines on carapace are constant (8 in 10 specimens additional to the type), but the lateral series are slightly variable in number. Smallest specimen examined 74 mm. long.

Although Stebbing says the armature of this species is unique, there is a close resemblance to *Panulirus angulatus* Bate (*Challenger* Rep., xxiv, pl. xi, figs. 2–4), of which *carinatus* Borrad. 1910 seems clearly to be a synonym.

Holthuis (p. 148) removes this species to the genus *Puerulus*, to which it belongs, he says, according to the "description and figure"; "it has, for instance, a distinct stridulating organ." Stebbing made no mention of any such organ, and such an organ is not present in this species. The 2nd pleopod in ♀ resembles that of *lalandii*.

Gen. Palinurus Fabr.

1900. Stebbing, Mar. Invest. S. Afr., i, p. 29.
1910. *Id.*, *l. c.*, p. 373.
1911. Gruvel, *l. c.*, p. 16 (part).
1936. Gurney, "Discovery" Rep., xii, p. 401 (*Phyllosoma*).

See key. 2nd peduncular joint of ant. 1 shorter than 3rd joint (adult). Endopod of 3rd–5th pleopods ♀ deeply forked, bearing the appendix interna at apex of inner fork; appendix interna on pleopod 2 ♀ present but small. The chela on 5th leg ♀ is formed by a basal process of the 7th joint impinging against the conically produced apex of 6th joint (fig. 101, *d*). Coxal joint of 5th leg ♂ not enlarged, opening of vas deferens as in *Jasus* (see also Miers, 1882, Proc. Zool. Soc. Lond., p. 541).

Remarks.—As here defined, the genus contains *vulgaris* (Western Europe, Mediterranean, N.W. Africa), *longimanus* (West Indies, with a variety from Mauritius), and *gilchristi*.

Key to the South African [and Mauritian] Species.

1. Abdominal segments with 2 rather wide transverse grooves. 1st pair of legs not enlarged, not chelate. Hind (upper) margin of frontal processes smooth . . . . . *gilchristi*.
2. Abdominal segments with 4 narrow grooves, some of them incomplete. 1st pair of legs long, robust, chelate, finger falcate and closing against a process of 6th joint. Hind (upper) margin of frontal processes each with 2 smaller spines . . . . . [*longimanus* var. *mauritianus*].

A brief description of the latter is here included.

Palinurus gilchristi Stebb.

Gilchrist's Crayfish.

Fig. 101, *c*, *d*.

1900. Stebbing, *l. c.*, p. 31, pl. 1.

1910. *Id.*, *l. c.*, p. 374.

1914. Selbie, Fish. Ireland Sci. Invest., i, p. 44 (quoted from Calman, 1925).

1936. Gurney, *l. c.*, p. 401, fig. 14 (*Phyllosoma*).

Frontal (ocular) processes far apart, splayed outwards (as in *vulgaris* var. *mauritanicus*, hind (upper) margin smooth, front margin with 4–6 teeth. The two submedian rows of spines on carapace are subparallel in front of the cervical groove, convergent behind. 1st pair of legs slightly shorter, only moderately stouter, than the others; 4th and 5th joints triquetral in cross-section, with a longitudinal groove on outer surface, the groove on 4th joint (incl. that of 1st leg) thickly pilose. Pleurae of abdominal segments 2–6 not so strongly dentate as in *vulgaris*. Abdominal segments 2–5 with a longitudinal groove on either side of the median keel, connecting the anterior and posterior transverse grooves, and forming an **H**-shaped sculpturing; all the grooves thickly pilose (the anterior groove is obsolete in *vulgaris*). Sternum roughly granulose, with 4 larger double tubercles medianly. Ventral surface of 6th abdominal segment in ♂ with a patch of spines.

Length ♂ up to 158 mm., ♀ 310 mm. (carapace length resp. 55 and 100 mm.). Orange or reddish, banded with yellowish white on abdomen, antennae, and legs; the pale marks on abdomen are mostly at the sides and oblique.

Localities.—False Bay and Agulhas Bank to Algoa Bay, 30–60 fathoms. Juveniles are occasionally found in Table Bay.

var. *natalensis* Brnrd.

1921. Gilchrist, Fish. Mar. Biol. Surv., Rep. i (1920), pp. 5, 16, pl. 7 (localities).

1922. *Id.*, *ibid.*, Rep. ii (1921), p. 1 (localities).

1923. Stebbing, *ibid.*, Rep. iii, Spec. Rep. 3, p. 7.

1925. Calman, *ibid.*, Rep. iv, Spec. Rep. 3, p. 21 (locality).

1925. Gilchrist, *ibid.*, Rep. iv, *passim* (localities).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 125.

1928. Cecil von Bonde, Fish. Mar. Biol. Surv., Rep. v, *passim* (localities).

1932. *Id.*, *ibid.*, Rep. ix, *passim* (localities).

1933. *Id.*, *ibid.*, Rep. x, *passim* (localities).

Resembles the following variety as regards smoothness of carapace, smooth legs and sternum, and the two points on under surface of 6th abdominal segment in ♂; but as regards sculpturing on upper surface of 2nd–5th abdominal segments is intermediate between typical *gilchristi* and var. *delagoae*.

Localities.—Natal coast, from off Umkomaas in the south as far north as off Tugela River mouth, and apparently extending farther north into the area of var. *delagoae*, 100–260 fathoms.

var. *delagoae* Brnrd.

1926. Barnard, *l. c.*, p. 123, pl. xi.

Carapace less spinose anteriorly, the groups of setae around bases of spines less well developed, anteriorly almost or quite obsolete. No longitudinal groove on either side of the median keel on abdominal segments 2–5 connecting the anterior and posterior transverse grooves; grooves shallower than in typical form, and almost or completely devoid of pilosity. 4th and 5th joints of legs subcylindrical (subtriquetral in 1st leg), 4th joint with longitudinal groove, 5th joint with slight groove (strongest on 1st leg), no pilosity. Sternum smooth except for the 4 median double tubercles and a few feeble rounded granules laterally. Ventral surface of 6th abdominal segment ♂ with only 2 small, blunt points.

Length ♂ up to 244 mm., carapace length 94 mm., carapace of a larger, but incomplete specimen measures 108 mm.

Localities.—Portuguese East Africa (25° 58′ S., 33° 5′ E.), 228 metres. Two other localities (in Gilchrist, 1922, Fish. Mar. Biol. Surv., Rep. ii), viz. 25° 51′ S., 33° 31′ E., and 26° S., 33° 19′ E. probably refer to this variety.

Remarks.—The s.s. *Pieter Faure* obtained no specimens east of Algoa Bay. Later trawling vessels, the s.s. *Pickle* and *Africana*, seem to have done little work between Algoa Bay and Natal, and there are no records of crayfish. From off Umkomaas and Illovo (approx. 30° 9′ S.) northwards Gilchrist's Crayfish becomes abundant and extends to the Delagoa Bay area.

In describing the two varieties it was pointed out that they were more closely related to one another than either of them to the typical

gilchristi, and that *delagoae* (incl. *natalensis*) appears to be a distinctive race in process of differentiation in deep water.

I have seen none of the abundant material obtained by the survey vessels, except the specimens (2 *delagoae*, 1 *natalensis*) originally submitted to me.

The differences between the typical form and *delagoae* offer a curious parallelism with those between *vulgaris* and its var. *mauritanicus* (*cf.* Gruvel, *l. c.*, 1911, p. 22, pl. 1, fig. 4): the latter has the carapace less spinose, squamose, and pilose, the sternites (except the 1st) are non-spinose, and the abdominal grooves are non-pilose. Gruvel does not mention the legs, but his figure of *vulgaris* f. *typica* (pl. 4, fig. 1) seems to show pilose grooves.

Palinurus longimanus M. Edw.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 294.

1882. Miers, Proc. Zool. Soc. Lond., p. 540, pl. 36, fig. 1 (var. *mauritianus*).

1911. Gruvel, *l. c.*, pp. 17, 18, fig. 7, and pl. 1, fig. 3.

1946. Holthuis, *l. c.*, p. 115 (*Justitia l.*) (references).

Frontal processes each with 2 smaller spines on hind (upper) margin; frontal margin with the median spine flanked by 2 spines, and followed by 3 median spines; no submedian paired spines either in front of or behind cervical groove, but about 8 spines in a transverse row immediately behind the groove. 1st pair of legs much longer and stouter than the others, 6th joint with a process on inner apex against which the abruptly curved, falcate finger impinges. Abdominal segments with narrow transverse grooves, usually 4, but some of them interrupted or incomplete.

Length 152 mm. (carapace 50 mm.). (As dried) red blotched with yellow, abdominal segments dotted with yellow, with a series of yellow spots on hind margins of 1st–5th segments, legs orange-yellow with paler spots (Miers). The typical form from the West Indies, the variety from Mauritius.

Remarks.—Holthuis has created the new genus *Justitia* for this species.

Gen. Palinustus M. Edw.

1880. Milne Edwards, Bull. Mus. Comp. Zool. Harv., viii, p. 66.

1911. Gruvel, *l. c.*, pp. 18–20 (*Palinurus* part).

1946. Holthuis, *l. c.*, p. 116.

See key. 2nd peduncular joint of ant. 1 shorter than 3rd joint.

Chela of 5th leg ♀ as in *Palinurus* (Gruvel, fig. 8, *d*). Coxal joint of 5th leg ♂ not enlarged, but genital opening on a short tubercle, apically setose and guarded by a membranous flap which closes *over* the rim of the tubercle.

Remarks.—Until 1929 only one ♀ was known (in Paris Museum), identified by Gruvel as *truncatus* M. Edw., West Indies. Gruvel does not describe the abdominal appendages. He considers that there are no real differences from *Palinurus*. Nevertheless the character of the frontal processes, the length of the 1st antennae, and the coxal tubercle on 5th leg ♂ are so distinctive that *Palinustus* should be at least a subgenus. Holthuis says it differs from all other Palinurid genera by possessing pleopods on 1st abdominal segment in ♀.

Palinustus mossambicus Brnrd.

Fig. 102, *a*, *b*.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 126, pl. xi.

1946. Holthuis, *l. c.*, p. 117, pl. vi, figs. *f–j*, pl. vii, figs. *f–h*, pl. x, figs. *a*, *b*, pl. xi, figs. *g*, *h*.

Carapace granulate, tuberculate, and pilose. Sternum and abdomen also pilose. Frontal margin with a pair of spines, but otherwise unarmed between the frontal processes. Upper and lower margins of 4th joint of 1st, 3rd, and 4th legs spinose (2nd and 5th legs missing). Mxp. 3 and all legs with long stiff hairs. Epistome with 6 denticles on middle lobe (2 median, flanked by 2 pairs), and 4 on lateral lobes.

Length 95 mm. (carapace 30 mm.). Salmon-red, crimson across front of carapace, abdomen with white spots on hind margins of segments and an oblique white line laterally on 2nd–5th segments, apices of pleurae also white; 1st antenna banded with white, flagella crimson; legs spotted and banded with white.

Locality.—Portuguese East Africa (25° S., 33° 10′ E.), 406 metres (Barnard).

Distribution.—East Indies (6° 58′ N., 121° 52′ E.), 72–80 metres (Holthuis).

Remarks.—Only the type ♂ was known until the Snellius Expedition captured 4 ♂♂ and 1 ♀ in 1929. Distinguished from *truncatus* M. Edw. (see Gruvel, 1911, *l. c.*, p. 18, fig. 8, and pl. 2, figs. 2, 3) by the absence of a median spine on frontal margin, which moreover has only 2 spines.

The East Indies specimens differ in having 4–6 small spines on frontal margin of carapace, instead of 2 strong spines, and in other minor details.

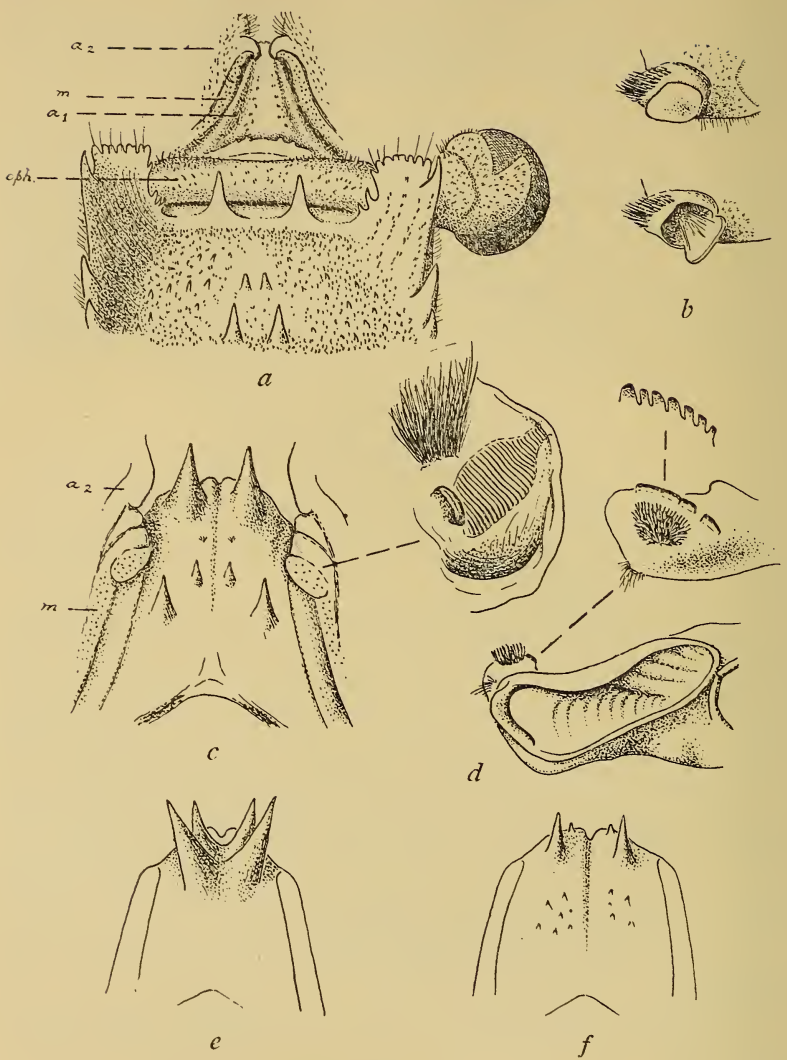


Fig. 102.—*Palinustus mossambicus* Brnrd. *a*, frontal region (frontal processes slightly asymmetrical in type), showing stridulating process of antenna 2 (a_2), membranous articulation (*m*), antennular segment (a_1) and ophthalmic segment (*oph.*) with eye-stalks. *b*, coxa of left 5th leg ♂, showing flap closed and open.

Panulirus bürgeri (de Haan). *c*, antennular plate, with base of antenna 2 (a_2) and membranous articulation (*m*), with inner view of stridulating knob further enlarged. *d*, coxa with ♂ genital opening of left 5th leg ♂, with inner end and the chitinous ridge of another specimen further enlarged.

Panulirus penicillatus (Olivier). *e*, antennular plate.

Panulirus japonicus (Siebold). *f*, antennular plate.

Gen. Panulirus (Gray) White

1908. Stebbing, Mar. Invest. S. Afr. in Ann. S. Afr. Mus., vi, p. 33.

1910. *Id.*, *l. c.*, p. 374.

1911. Gruvel, *l. c.*, pp. 27 and 50 (key to species).

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, pp. 33 (list of species) and 42.

1936. Gurney, *l. c.*, p. 405 (*Phyllosoma*).

1946. Holthuis, *l. c.*, p. 122.

See key. 3rd peduncular joint of ant. 1 slightly shorter than 2nd (adult). Endopod of pleopods 3–5 ♀ not deeply cleft, lanceolate, the appendix interna attached to a short projection on its inner margin; appendix interna on pleopod 2 ♀ present but small. Chela of 5th leg ♀ as in *Palinurus*. Coxal joint of 5th leg in adult ♂ conspicuously enlarged transversely to axis of body, orifice of vas deferens large (*regius* and *ornatus* not seen by me); in *bürgeri* and *penicillatus* the orifice of the vas deferens is guarded by a creased and in-folded membrane which appears as if it might be protruded and expanded in the form of a funnel to cover the ♀ aperture; but I have seen no living or fresh specimens.

Remarks.—The presence or absence of the exopod, and its flagellum, on the 2nd and 3rd maxillipeds are specific characters.

The genus is widely distributed, chiefly in tropical and temperate regions, but is not represented in Europe.

Key to the South African Species.

I. Abdominal segments with transverse grooves.

A. Abdominal grooves not interrupted medianly.

1. Exopod of mxp. 3 absent, exopod of mxp. 2 without flagellum. Antennular plate with 4 large spines spaced en carré (fig. 102, *c*) . *bürgeri*.

2. Exopod of mxp. 3 present but without flagellum, of mxp. 2 with flagellum. Antennular plate with 4 large spines united at their base (fig. 102, *e*) . . . . . *penicillatus*.

3. Exopod of mxp. 3 with flagellum. Antennular plate with 2 major spines (fig. 102, *f*) . *japonicus*.

B. Abdominal grooves interrupted medianly.

1. Mxp. 2 and 3, and antennular plate as in *bürgeri* *dasypus*.

2. Exopod of mxp. 3 absent, of mxp. 2 with flagellum. Antennular plate with 4 major spines en carré . . . . . *regius* (Angola).

II. Abdominal segments without grooves.*

A. Exopod of mxp. 2 without flagellum. Legs and abdomen with pale spots. Carapace anteriorly speckled and vermiculate . . . . *ornatus.*

B. Exopod of mxp. 2 with a small single-jointed flagellum. Legs with longitudinal, abdomen with transverse pale stripes. Carapace with a pale longitudinal stripe on side . . . . . *versicolor.*

C. Exopod of mxp. 2 with many-jointed flagellum. A pale stripe across each abdominal segment [*polyphagus*, Mauritius].†

Panulirus bürgeri (de Haan)

Bürger's Crayfish.

Fig. 102, *c*, *d*.

1908. Stebbing, *l. c.*, p. 34.
1910. *Id.*, *l. c.*, p. 374.
1911. Gruvel, *l. c.*, p. 32, fig. 14, and pl. 1, fig. 6.
1918. Barnard in Gilchrist, Mar. Biol. Rep., iv, p. 50.
1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 21.
1946. Holthuis, *l. c.*, p. 128 (*homarus* Linn.).

Abdominal grooves always uninterrupted, crenulate with flattened, rounded squamae, pilose. Antennular plate with 4 major spines, separate, en carré, with 2-4 denticles and some little tufts of setae in the centre. Inner end of coxa of 5th leg ♂ with a patch of soft setae, and a hard chitinous keel, more or less lobed or divided into blunt teeth (fig. 102, *d*).

Length ♂ up to 170, ♀ 160 mm. (carapace length resp. 57 and 55 mm.) excl. frontal spines (S. African specimens). Gruvel's figure shows a carapace 150 mm. long. Olivaceous or bluish, speckled and dotted with yellow, a yellow line (more or less divided into short lines or dots) and a yellow lateral spot on each abdominal segment; legs and antennae more or less spotted with yellow.

Localities.—Algoa Bay, East London, Durban, 0–20 fathoms (Stebbing, and S. Afr. Mus.); off Natal coast, 34 fathoms (Calman).

Distribution.—East Indies, south coast of Arabia (var. *megasculptus* Pesta 1915), Madagascar. ? Japan.

* Young specimens of *polyphagus* and *versicolor* may show traces of grooves.

† *P. polyphagus* Herbst 1796 (syn. *fasciatus* Fabr. 1798, M. Edwards 1837); Gruvel, 1911, *l. c.*, pl. 5, fig. 3; Holthuis, *l. c.*, p. 136.

Remarks.—The smallest specimen seen by me is 53 mm. in length, and is a typical *bürgeri* as regards the abdominal sculpturing.

Holthuis proposes to adopt the name *homarus* (Linn.) for this species.

Panulirus dasypus (Latr., M. Edw.)

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 300.

1911. Gruvel, *l. c.*, p. 34, fig. 15, and pl. 2, fig. 5.

1916. de Man, *l. c.*, p. 48.

1946. Holthuis, *l. c.*, p. 134 (references, and differences from *bürgeri*).

Resembles *bürgeri* in all characters, including structure of coxal joint of 5th leg ♂, except abdominal grooves interrupted medianly (in the present specimen on segments 3–5 only, uninterrupted on 2 and 6), feebly denticulate or crimped laterally but medianly almost or quite smooth, never with rounded squamae, feebly pilose, and coloration different.

Length S. Afr. Mus. ♂ 232 mm., carapace 87 mm. (Gruvel's figure shows a carapace of 184 mm., and Milne Edwards gives 350 mm. as total length). Clear olive-green, finely speckled with pale yellow or white on peduncles of 2nd antennae and on carapace anteriorly, abdomen with pale dots, small on first 3 segments, larger on last 3 and base of tail-fan (no transverse pale lines), legs uniformly green (except 1st pair), only the spines pale.

Locality.—One ♂ said to have been caught at Isipingo, Natal, 1930 (S. Afr. Mus.).

Distribution.—Indian Ocean, Ceylon, Madras, East Indies.

Remarks.—It would seem as if this form ought to be regarded merely as a variety of *bürgeri*, though Gruvel has no doubt of their specific distinctness. Perhaps the examination of a large number of both forms of all sizes might throw some light on the question.

A second ♂ specimen (carapace length 88 mm.), also said to have come from the Natal coast, is intermediate between typical *bürgeri* and *dasypus*: all the abdominal grooves are uninterrupted, pilose, those on 2nd–4th segments merely crimped or feebly crenulate, those on 5th and 6th segments scalloped with rounded squamae as in *bürgeri*; hind margin of segments 1–5 with a transverse row of pale dots, legs uniform.

Panulirus penicillatus (Olivier)

Variegated Crayfish.

Fig. 102, *e.*

1908. Stebbing, *l. c.*, p. 33.
1910. *Id.*, *l. c.*, p. 374.
1911. Gruvel, *l. c.*, p. 31, fig. 13, and pl. 2, fig. 4, pl. 3, fig. 2.
1916. de Man, *l. c.*, p. 45, pl. 2, fig. 6 (antennular plate).
1918. Barnard in Gilchrist, *l. c.*, p. 51.
1946. Holthuis, *l. c.*, p. 125 (references).

Abdominal grooves uninterrupted, without pilosity (except very feebly at sides), surface of segments smooth, without squamae, merely pitted. Antennular plate with 4 large spines united at their base. Inner end of coxa of 5th leg ♂ with a sharp chitinous entire keel and no patch of setae.

Length ♂, S. Afr. Mus., 315 mm. (carapace 130 mm.) (M. Edwards: 450 mm., Gruvel's figure of carapace 188 mm.). Bluish green, more or less spotted with yellow on carapace and bases of 2nd antennae and sternum, abdomen dotted with yellow, legs with yellow longitudinal straight or wavy lines.

Locality.—Mozambique (island) (coll. K. H. B.).

Distribution.—Mauritius, Réunion, Red Sea, Indian Ocean, East Indies, Pacific islands, north coast of Australia.

Remarks.—The alleged locality Agulhas Bank (Stebbing) is very unlikely. I have no actual record of this species from the coast of southern Africa within the Union.

Panulirus japonicus (Siebold)

Japanese, or Long-legged, Crayfish.

Fig. 102, *f.*

1868. Milne Edwards, Nouv. Arch. Mus. Paris, iv, p. 87, pl. 21 (*longipes*).
1906. Rathbun, Bull. U.S. Fish. Comm. (1903), pt. 3, p. 897, pl. 5 (coloured).
1911. Gruvel, *l. c.*, p. 28, fig. 11, and pl. 5, figs. 1, 2 (3 on plate, figs. transposed).
1916. de Man, *l. c.*, p. 44.
1918. Barnard in Gilchrist, *l. c.*, p. 51.
1929. McNeill, Rec. Austral. Mus., xvii, p. 148.

1938. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiii, p. 101, pl. 1 (sex dimorphism).

1946. Holthuis, *l. c.*, p. 123, pl. xi, fig. *n* (references).

Abdominal grooves uninterrupted, pilose. Antennular plate with 2 major spines, in front of these 2–4 small denticles on margin, and behind them a group of very small denticles. 2nd leg longest. Inner end of coxa of 5th leg ♂ with a sharp chitinous entire keel, and no patch of setae.

Length ♂, S. Afr. Mus., 233 mm. (carapace 82 mm.) (Gruvel's figure of carapace 120 mm.). Violaceous or indigo, sides of carapace brownish, yellowish-white spots mostly on larger spines on carapace, abdomen dotted with yellowish white with a larger spot on each segment laterally, tail-fan reddish towards hind margin with a white marginal line, peduncles of both antennae with white marks, flagella with white bands, legs and 3rd maxillipeds violaceous with yellowish-white longitudinal lines, and a few spots, 3rd–5th pleopods (♂) each with a white spot.

Locality.—No authentic record from the coast of the Union; Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Mauritius, Réunion, Zanzibar, Indo-Pacific, Japan.

Remarks.—Specimens, alleged to have been caught at Durban or on the Natal coast, have been sent to the South African Museum; I am inclined to think they may have emanated from Delagoa Bay or Mauritius. The specimen submitted for identification by the Lourenzo Marques Museum was presumably caught in Delagoa Bay.

Panulirus regius (Br. Cap.)

Royal Crayfish; Langouste royale.

1864. Brito Capello, Desc. crost. Afr. occid. Lisbon.

1906. Nobili, Mem. Soc. Espan., i, p. 300, pl. 8, figs. 1, 1, *a–d.*

1911. Gruvel, *l. c.*, p. 35, fig. 16, and pl. 2, figs. 6, 7, pl. 3, figs. 4, 5.

1916. Balss, Beitr. Meeresf. Westafr., ii, p. 32.

1917. Bouvier, Res. Sci. Camp. Monaco, fasc. 50, p. 91, pls. 8 (coloured), 9.

1926. Schmitt, Bull. Amer. Mus. Nat. Hist., liii, p. 42, fig. 67 (*Puerulus*).

1933. Monod, Bull. Et. hist. sci. Afr. occid. Franc., xv, p. 12.

Abdominal grooves shallow, uninterrupted on 1st segment, interrupted on 2nd–6th segments. Antennular plate with 4 major

spines en carré, usually with minor denticles in centre (Bouvier (*l. c.*) records a specimen with 3 pairs of major spines).

Length up to about 300 mm. (carapace: Bouvier's fig. 112 mm., Gruvel's fig. 171 mm.). Bluish or olivaceous green, a broad yellowish band on ventro-lateral portion of carapace, abdominal segments each with a transverse yellow band, bordered with blue in front and behind, on hind margin, and a yellow spot laterally, legs greenish with yellow longitudinal stripes.

Locality.—Mossamedes.

Distribution.—West coast of Africa, from about 23° N. lat. southwards.

Panulirus ornatus (Fabr.)

Ornate Crayfish.

1798. Fabricius, Suppl. Entom. Syst., p. 400.
1837. Milne Edwards, Hist. Nat. Crust., ii, p. 296.
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 827.
1911. Gruvel, *l. c.*, p. 47, fig. 22, and pl. 6, fig. 2.
1916. de Man, *l. c.*, p. 51, pl. 2, fig. 7, *b*, *c* (mxp. 2, 3) (references).
1918. Barnard in Gilchrist, *l. c.*, p. 51.
1918. Stebbing, Ann. Durban Mus., ii, p. 59.
1921. Balss, K. Sv. Vet. Ak. Handl., lxi, no. 10, p. 17.
1946. Holthuis, *l. c.*, p. 138, pl. vii, fig. *i*, pl. ix, fig. *d*.

Abdomen without grooves at any stage. Exopod of mxp. 2 tipped with a small tuft of setae (no flagellum). Antennular plate with 2 pairs of major spines en carré, the hinder pair the smaller, with some denticles in the centre. The 3 pairs of submedian spines in front of cervical groove slightly diverging, the 3 pairs behind the groove converging posteriorly.

Length S. Afr. Mus. specimen 248 mm. (carapace 83 mm.) (Gruvel's figure of carapace 180 mm.). Bluish or greenish, carapace anteriorly marbled and vermiculate with pale cream lines, abdominal segments with dark blue cross-bands, with one or two cream-coloured oblique spots or marks laterally; legs and peduncles of 1st antennae banded, spotted or marbled with cream on a greenish ground-colour, peduncles of 2nd antennae with cream vermiculate lines, flagella of 1st antennae with pale bands.

Localities.—Mozambique (Hilgendorf); Durban (Stebbing, and S. Afr. Mus.); Delagoa Bay (Lourenzo Marques Mus.).

Distribution.—Mauritius, Zanzibar, Indo-Pacific, Australia.

Panulirus versicolor (Latr.)

Striped Crayfish.

1804. Latreille, Ann. Mus., iii, p. 394.

1910. Rathbun, Proc. U.S. Nat. Mus., xxxviii, p. 560, pl. 52, fig. 1 (*fasciatus*, non Fabr.).

1911. Gruvel, *l. c.*, p. 48, pl. 6, fig. 3 (*ornatus* var. *taeniatus*).

1916. de Man, *l. c.*, pp. 55–63, pl. 2, figs. 7, 7, *a* (mxp. 2, 3), and 8, 8, *a–e* ("Natant" stage) (references and synonymy).

1918. Barnard in Gilchrist, *l. c.*, p. 52 (*fasciatus* de Haan, non Fabr.).

1926. Musgrave, Austral. Zoolog., iv, p. 205, pl. 27, fig. 3 (*fasciatus* de Haan).

1926. McNeill, *ibid.*, iv, p. 302.

1935. C. von Bonde and Marchand., Fish. Mar. Biol. Surv. S. Afr., Fish. Bull., no. 1, p. 7 (*fasciatus* de Haan, non Fabr., quoted from Barnard, 1918).

1946. Holthuis, *l. c.*, p. 142, pl. vii, fig. *j*, pl. ix, fig. *b*, pl. xi, figs. *e, f, m* (references).

Abdomen without grooves in adult but with indications of grooves on 2nd–4th segments in young. Exopod of mxp. 2 with a small triangular single-jointed flagellum. Antennular plate as in *ornatus*. The 3 submedian pairs of spines in front of and the 3 pairs behind the cervical groove form a parallel series.

Length S. Afr. Mus. specimen 135 mm. (carapace 45 mm.) (de Man's figure: carapace 120 mm., Gruvel's 150 mm.). Carapace dark red-brown (in preserved specimens), with the greater part of the dorsal area except around bases of spines pale cream-coloured, a pale stripe from postero-lateral corner to anterior margin between the antero-lateral corner and the supra-orbital spine; abdominal segments each with a dark transverse band on hind margin with a narrow pale stripe running through it; hinder third of tail-fan purplish blue, margin red; peduncles of 2nd antennae pale with bases of the spines dark, legs and peduncles of 1st antennae with pale longitudinal stripes on a dark ground-colour; pleopods (♂) dark purplish-brown with pale edge and pale central stripe. In a specimen from Port St. Johns the dark ground-colour of carapace is indigo blue, the dorsal part olive-green, the abdomen dull olive-green with the dark bands nearly black, ground-colour of the legs prussian-blue; the colours are said to be brighter in life.

Localities.—Durban harbour and Port St. Johns (S. Afr. Mus.): Delagoa Bay (coll. van der Horst).

Distribution.—East coast of Africa, Mauritius, Seychelles, Indo-Pacific to Japan.

Remarks.—In the case of this beautifully coloured species, the records of its occurrence in South African waters are reliable. At Port St. Johns it is said to be frequently caught by the fishermen when seining in deep water.

Phyllosoma Stage.

Jasus lalandii (Lam., M. Edw.)

Fig. 103.

1910. Stebbing, *l. c.*, p. 376 (*Phyllosoma* sp.).

1936. Gurney, *l. c.*, p. 420, figs. 28, 29.

Distinguishing features seem to be: no strong spine on basal joint of ant. 2; no exopod with plumose setae on either mxp. 2 or mxp. 3 at any stage.

The course of development is given in the papers of Gilchrist and of Cecil von Bonde quoted above (pp. 538, 539). Figures of three stages (from Gilchrist 1916) are reproduced here.

It may be noted that Thomson (1907, Trans. N. Zeal. Inst., xxxix [1906], p. 484, pl. 20 *) briefly mentioned the early stage, later called the "Naupliosoma" by Gilchrist, in the New Zealand form (*edwardsii*). This stage precedes the *Phyllosoma* stage, and lasts only a few hours.

Palinurus gilchristi Stebb.

1930. Willem von Bonde, Fish. Mar. Biol. Surv., viii, Spec. Rep. 1, p. 9, pls. 1, 2, 8, 9, and 10, fig. 17 (*Phyllosoma* and *Puerulus*).†

1936. Gurney, *l. c.*, p. 401, fig. 14.

The *Phyllosoma* assigned to this species has a strong spine on basal joint of ant. 2, and both mxp. 2 and mxp. 3 have plumose exopods (in the 15·6 mm. stage).

* Volume number and year of publication misquoted in Gilchrist, 1920, p. 201.

† In Gurney (1936, pp. 402, 405, 418, 428, 430, 440; and in 1939, Bibliogr. Larvae Dec. Crust., Ray Soc. Publ., 125, p. 8), this paper is credited to Cecil instead of Willem von Bonde, and wrongly dated 1932 instead of 1930.



Fig. 103.—*Phyllosoma* stages of *Jasus lalandii* (Lam., M. Edw.).
Top: 1·7 mm. in length.
Middle: 3·8 mm. in length.
Bottom: 35 mm. in length.
(From Gilchrist, J. Linn. Soc. Lond., xxxiii, pls. 14–16, 1916.)

Panulirus sp.

1930. Willem von Bonde, *l. c.*, p. 18, pls. 3, 10, figs. 18–23, 11 (*Phyllosoma* and *Puerulus*).

Cephalic shield oval or piriform, narrowing in front. No spine on basal joint of ant. 2. Mxp. 3, but not mxp. 2, with plumose exopod.

Family SCYLLARIDAE.

1910. Stebbing, *l. c.*, p. 372.

1915. *Id.*, Ann. S. Afr. Mus., xv, p. 61.

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, pp. 64 *sqq.*

1917. Bouvier, Res. Sci. Camp. Monaco, fasc. 50, p. 98.

1936. Gurney, "Discovery" Rep., xii, p. 426 (*Phyllosoma* stage).

1946. Holthuis, Dec. Macrura Snellius Exp. Temminckia, vii, p. 87.

Carapace more or less flattened dorso-ventrally; gripped between a lobe of 1st abdominal segment and a knob on last thoracic segment (as in *Palinuridae*). Eyes in definite orbits. Ant. 2 modified, consisting of 4 movable joints, the 2nd and 4th (referred to in the descriptions below as the proximal and distal joints) lamellately expanded (fig. 104, *c*, *e*). Legs with only 6 apparent joints (as in *Palinuridae*). No appendages on 1st abdominal segment; 2nd–5th pleopods in ♂ biramous, more or less lamellate, but successively reduced in size; in ♀, as in *Palinuridae*, endopod of 2nd pleopod lamellate, of 3rd–5th rod-like with appendix interna. A small chela on 5th leg in ♀ (except in *Thenus*).

Development.—The *Phyllosoma* stage as in the *Palinuridae*, but distinguished by the stout 2nd antennae (fig. 104, *f*), which foreshadow the broad, plate-like 2nd antennae of the adult. Post-larval stages, corresponding with the *Puerulus*, have been regarded as distinct genera under the names *Pseudibacus* and *Nisto*.

Key to the South African [Mauritian] Genera.

1. Body moderately depressed, subcylindrical, carapace not broader than long.
   - *a*. Exopod of mxp. 3 without flagellum. Rostrum short and truncate. Gills 19 . . . . . *Scyllarus.*
   - *b*. Exopod of mxp. 3 with flagellum. Rostrum salient. Gills 21 . . . . . *Scyllarides.*
2. Body strongly depressed, lamellate, carapace broader than long (fig. 104, *c*).

a. Eye-sockets nearer to middle-line than to outer angles of carapace (fig. 104, *c*) . . . . . *Ibacus.*
b. Eye-sockets at outer angles of carapace (fig. 104, *e*) . *Thenus.*
c. Eye-sockets midway between middle-line and outer angles of carapace . . . . . *Parribacus*, Mauritius.

Gen. Scyllarus Fabr.

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 29.

1916. de Man, *l. c.*, pp. 64, 67 (list of species and key to Indo-Pacific species).

1917. Bouvier, *l. c.*, p. 105.

1921. de Man, Zool. Med., vi, p. 92 (correction to 1916 key).

1938. Bage, Austral. Antarct. Exp., C, ii, pt. 6, p. 10 (*Arctus*).

1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 272.

1946. Holthuis, *l. c.*, p. 89.

Gills 19. Mxp. 2 without gills, its exopod transformed into a lamellate process, supposed to aid the scaphognathite (mx. 2) in producing a current of water.

Bouvier (1915, Bull. Sci. Fr., xlviii, p. 188, figs. 2–4) described *S. thiriouxi* from Mauritius.

Key to the South African Species.

1. Abdominal segments with arborescent or squamiform sculpture (fig. 104, *a*, *b*).
   a. 6th joint of 3rd leg with cultrate inner margin and forming with the dactyl a subchela . . . *cultrifer.*
   b. 6th joint of 3rd leg normal, cylindrical . . . *martensii.*
2. Abdominal segments tuberculate, without squamiform sculpture. 6th joint of 3rd leg normal, cylindrical . *tuberculatus.*

Scyllarus cultrifer (Ortm.)

Fig. 104, *a*.

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 66, pl. 9, fig. 3 (*sordidus*, non Stimpson).

1897. Ortmann, Zool. Jahrb. Abt. Syst., x, p. 272.

1916. de Man, *l. c.*, pp. 68, 77.

1936. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 122, pl. 10 (*sordidus* Bate, non Stimpson).

1946. Holthuis, *l. c.*, p. 93, pl. 8, figs. *c–e*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Carapace with short dense pile nearly concealing the squamose sculpturing; median keel with 2 teeth anteriorly, the 2nd strongly elevated, and a pair of denticles immediately behind cervical groove; 2 supra-orbital teeth; laterally one tooth behind the level of orbit, and a blunter one at cervical groove. Abdominal segment 1 with obliquely-longitudinal ribs; segments 2–5 with a transverse groove interrupted medianly, sculpture in front of the groove rounded squamae, behind the groove obliquely-longitudinal ribs, segment 6 with rounded squamae; telson with 2 sharp points on the calcified portion. Proximal joint of ant. 2 with a single oblique ridge, 2 teeth on both outer and inner (frontal) margin; distal joint with 5 acute teeth, and a denticle on inner margin.

Length ♂ up to 70 mm., ♀ 75 mm. (Bate). Rusty-red, paler towards end of abdomen, eyes dark maroon.

Locality.—Portuguese East Africa (26° 3′ S., 33° 4′ E.), 290 metres (Barnard).

Distribution.—Arafura Sea, 140 fathoms (Bate); East Indies (Holthuis); Japan (Ortmann).

Remarks.—The change of name follows Ortmann and de Man, whose papers were not available to me in 1926. The 3rd legs were missing (as my figure shows), and the identification was based on other features which appeared to be in conformity with Bate's description and figure. The specimen is no longer accessible to me, and the enlarged representation of the sculpturing is taken from my original photograph.

Scyllarus martensii Pfr.

Fig. 104, *b*.

1881. Pfeffer, Panzerkrebs. Hamburg Mus., p. 48.

1891. Ortmann, Zool. Zahrb. Abt. Syst., vi, p. 44.

1904. Borradaile, F. Geogr. Mald. Laccad. Archip., ii, p. 754, pl. 58, fig. 4.

1906. Rathbun, Bull. U.S. Fish. Comm. [1903], pt. 3, p. 896, pl. 18, fig. 2.

1916. de Man, *l. c.*, pp. 70, 84, pl. 3, figs. 13, 13, *a*.

1920. Stebbing, Ann. S. Afr. Mus., xvii, p. 267 (*Thenus orientalis*, non Lund).

1946. Holthuis, *l. c.*, p. 96.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Carapace with short dense pile not concealing the numerous squamiform or nodiform tubercles, a double medio-dorsal row of tubercles,

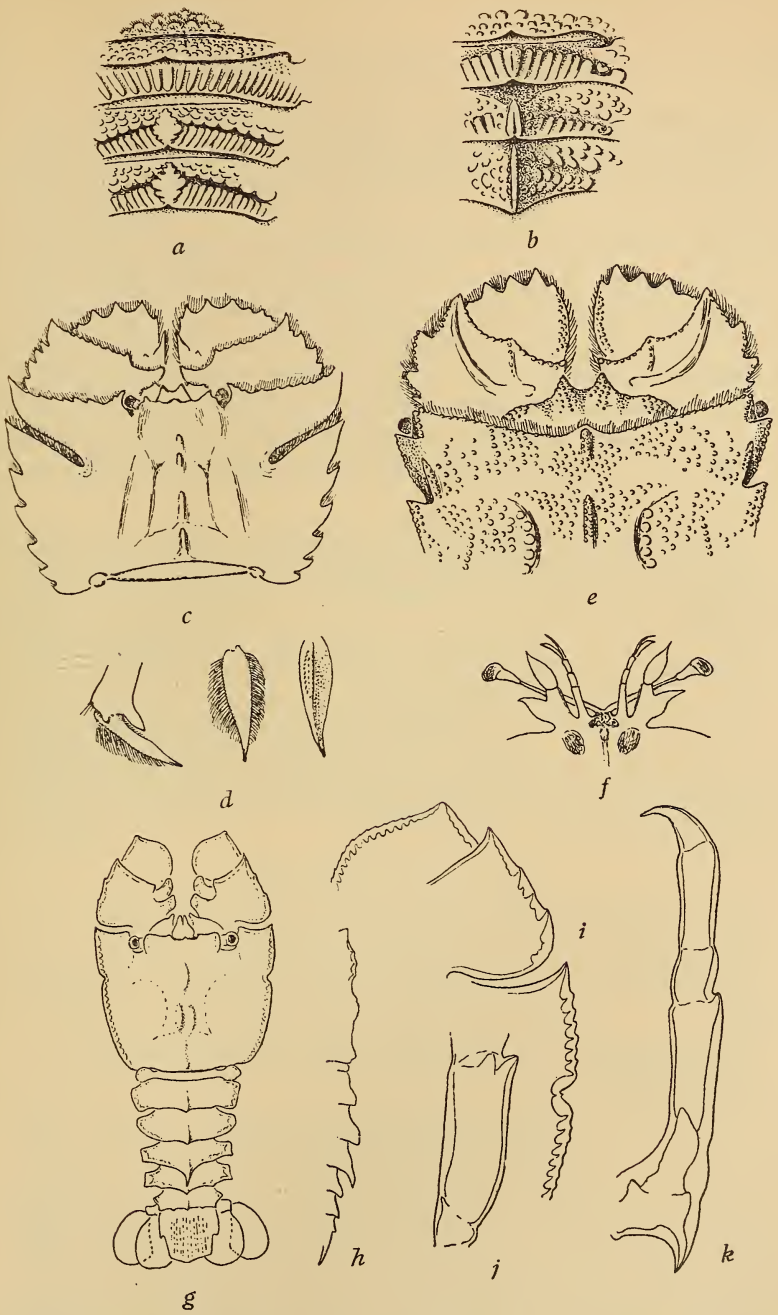


FIG. 104.—*Scyllarus cultrifer* (Ortm.). *a*, hind margin of carapace, and first three abdominal segments, to show sculpture.

Scyllarus martensii Pfr. *b*, the same.

Ibacus incisus (Péron). *c*, carapace with bases of 2nd antennae. *d*, apex of 6th joint and dactyl of 5th leg, ♀, with outer and inner views of dactyl.

Thenus orientalis (Lund). *e*, anterior part of carapace with bases of 2nd antennae.

Phyllosoma of a Scyllarid. *f*, anterior part of specimen 42 mm. in length, to show the stout 2nd antennae.

Nisto stage of *Scyllarides*. *g*, specimen 29 mm. in length, nearly ready for ecdysis. *h*, profile of carapace and abdomen. *i*, portion of carapace and ant. 2 showing new skin within the old. *j*, 4th joint of 1st leg. *k*, ventral view of 5th left leg.

hind margin distinctly notched medianly. Abdominal segment 1 with obliquely longitudinal ribs; segments 2–5 with transverse groove interrupted medianly by a raised keel or ridge, which is particularly prominent on segment 3, and narrowly bifurcate on segment 2, sculpture in front of groove rounded-squamose, behind the groove obliquely ribbed on segment 2, but becoming more squamose on the other segments; telson with rounded squamae on calcified part. Proximal joint of ant. 2 with a single oblique ridge, outer margin with 4 and anterior margin with several denticles; distal joint with 5–6 blunt or subacute digitiform lobules separated by deep incisions. Sternum (thoracic) in ♀ with a median rounded tubercle on each of segments 2–5, in juv. (? ♂) a sharp median tubercle on 5th segment only.

Length ♀ up to 36 mm. (de Man). General colour greyish (de Man).

Localities.—Durnford Point, Zululand, 13 fathoms (Stebbing); Portuguese East Africa (S. Afr. Mus., don. Dr. Gilchrist, without exact locality).

Distribution.—Zanzibar, Maldive and Laccadive Archipelago, East Indies, Singapore, Hawaiian Is., Japan.

Remarks.—The 30 mm. ♀ (received from the late Dr. Gilchrist after my 1926 paper was printed) at once showed my error in assigning Stebbing's 18 mm. juv. (? ♂) (recorded by him as *Thenus orientalis*) to *tuberculatus* instead of to this species.

Scyllarus tuberculatus (Bate)

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 70, pl. 10, figs. 1, 2.

1916. de Man, *l. c.*, pp. 65, 68 (listed and in key).

1926. Barnard, *l. c.*, p. 123, pl. 10 (excl. reference to Stebbing, 1920).

1946. Holthuis, *l. c.*, p. 89, pl. 7, fig. *c*, pl. 8, fig. *a*, pl. 9, fig. *c* (*rugosus* M. Edw.).

Carapace with a double row of tubercles or nodules medio-dorsally and dorso-laterally, with some scattered tubercles between, sides tuberculose. Abdominal segments deeply grooved but without arborescent or squamose sculpture, segment 1 smooth, the following segments increasingly tuberculose or nodose, 2nd–5th segments with median ridge, most prominent on 3rd and 4th segments, on 3rd forming a mushroom-shaped knob. Proximal joint of ant. 2 with a single oblique ridge, outer margin with 4 and anterior margin with several denticles; distal joint with 5–6 blunt digitiform lobules separated by deep incisions. Sternum ♀ without prominent tubercles.

Length up to 58 mm. (♀ Barnard). Red mottled with paler red and white, most of the tubercles with white tips, outer margin of distal joint of 2nd antennae and the smooth dorsum of 1st abdominal segment violet (♀ Barnard).

Locality.—Portuguese East Africa (26° 17′ S., 33° 10′ E.), 415 metres (Barnard).

Distribution.—Between New Guinea and Australia, Singapore, Gulf of Manar, Japan.

Remarks.—The examination of further material, and reference to de Man's paper, show that Stebbing's small specimen cannot, as I thought in 1926, be the young of this species.

Holthuis (*l. c.*) adopts the name *rugosus* M. Edw.

Gen. Scyllarides Gill

1894. Ortmann, Semon's Austral: Reise, v, p. 19 (key to species) (*Scyllarus*, non Fabr.).

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 29.

1910. *Id.*, *l. c.*, p. 372.

1916. de Man, *l. c.*, p. 65 (list of species).

1917. Bouvier, *l. c.*, p. 104.

1936. Gurney, *l. c.*, p. 427 (*Phyllosoma* stage).

Gills 21. Mxp. 2 with 2 gills, its exopod normal, not lamellately expanded.

Key to the South African [and Mauritian] Species.

1.	4th and 5th joints of all legs slightly ridged but not sharply keeled. Antero-lateral corner of carapace acute . .	*elisabethae.*
2.	4th joint of legs with strong, sharp wing-like keel; 5th joint with 2 keels, best developed on the anterior legs. Antero-lateral corner of carapace obtuse-angled . .	[*squammosus*, Mauritius].*

Scyllarides elisabethae (Ortm.)

Port Elizabeth Crayfish.

1894. Ortmann, *l. c.*, p. 20, pl. 2, fig. 3.

1908. Stebbing, *l. c.*, p. 30, pl. 30.

* *squammosus*, *sic* in Milne Edwards, 1837. The post-larval or *Nisto* stage has been described and figured by Miers (1882, Proc. Zool. Soc. Lond., p. 542, pl. 36, figs. 2, 3) as *Pseudibacus pfefferi* from Mauritius. Ortmann (1894) has recorded the adult from Mauritius, and there is a specimen (ex-coll. Robillard) in the South African Museum.

1910. *Id.*, *l. c.*, p. 372.

? 1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 282.

1918. Barnard in Gilchrist, Mar. Biol. Rep., iv, p. 52 (*elizabethae*, sic).

1921. Gilchrist, Fish. Mar. Biol. Surv., Rep. i, *passim* (localities).

1922. *Id.*, *ibid.*, ii, *passim* (localities).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 24.

1930. Willem von Bonde, Fish. Mar. Biol. Surv., viii, Spec. Rep. 1, pp. 27–36, pls. 4–7, 12–14.*

1932. Cecil von Bonde, *ibid.*, ix, *passim* (localities).

1933. *Id.*, *ibid.*, x, *passim* (localities).

1936. Gurney, *l. c.*, p. 432, fig. 37 (*Phyllosoma*).

A distinct indentation (cervical groove) on the lateral margin shortly behind level of orbits. Antero-lateral corner of carapace sharply produced forwards. Abdominal segments 2–4 with median longitudinal hump; pleura (coxal plate) of segment 1 with a single blunt lobe. Terminal joint of ant. 2 broader than long; penultimate joint with 5 more or less equally spaced teeth on outer margin (the proximal one very small). Legs strongly pitted; dactyl of 4th and 5th legs (both sexes) rather noticeably flattened and grooved on outer surface; process of 6th joint of 5th leg ♀ (forming the chela) small.

Length ♀ up to 240 mm. (incl. rostrum), width across front of carapace 93 mm. Bright red, more or less mottled, legs cream banded with purple-red or dark maroon.

Localities.—Port Elizabeth (Ortmann, Stebbing); Agulhas Bank from St. Sebastian Bay to Algoa Bay, 20–60 fathoms (Stebbing; S. Afr. Mus.); Table Bay (*fide* the late Dr. L. Péringuey). In the Fishery Survey Reports the most westerly locality is 34° 50′ S., 29° 18′ E.; off the Natal coast in the neighbourhood of Durban, 20° 42′ S. to 30° 13′ S., 132–172 fathoms.

Distribution.—St. Helena, 45–55 fathoms (Stebbing).

Remarks.—The Table Bay record is to be accepted with caution, although W. von Bonde records "a large Scyllarus larva" from west of Cape Point.

The occurrence of this species at St. Helena, as reported by Stebbing, is even more remarkable. According to Rathbun (1900, Proc. U.S. Nat. Mus., xxii, p. 309) *S. latus* (Latr.) was recorded from this island by Bate (? ubi. not in the *Challenger* Rep., xxiv), and there is in the

* It may be "probable" that all the stages of the *Phyllosoma* described are stages of *S. elisabethae*, but there is no conclusive evidence that some of them may not be *Ibacus* or *Thenus*.

South African Museum a specimen of this latter species received in exchange from the Argentine Museum, and said to have come from St. Helena.

S. elisabethae is extremely closely allied to the New South Wales species *sculptus* (Latr., M. Edw.).

Nisto Stage (fig. 104, *g–k*). A specimen, 29 mm. in length from frontal margin to end of telson, was picked up on the beach at Port St. Johns in September 1941. It agrees with Miers' description of *Pseudibacus pfefferi* (*l. c., supra*, p. 561, footnote), and may belong to either *elisabethae* or *squammosus*. The exopod of mxp. 3 has a flagellum. The specimen is almost ready to moult, and the new skin is serrulate and spinulose on the lateral margins of carapace and abdominal segments, and the margins of the 2nd antennae. The 4th joint of all the legs has an apical spine on the new skin. The coxal joint of the 5th leg has a strong recurved spine on both the old and the new skins. White, semi-transparent, the cornea brown, and the gills pink.

Gen. Ibacus Leach

1910. Stebbing, *l. c.*, p. 372.

1916. de Man, *l. c.*, p. 65 (list of species).

1923. Stebbing, Fish. Mar. Biol. Surv. Rep., iii, Spec. Rep. 3, p. 6.

Gills 21–28. Margin of carapace deeply incised in the position of the cervical groove, but no groove dorsally. 4th joint of mxp. 3 inflated, with 5–6 transverse fissures from inner margin, outer margin forming a serrate or spinose crest.

Ibacus incisus (Péron)

Fig. 104, *c*, *d*.

Péron, Coll. du Mus. Paris (? ined.).

1815. Leach, Zool. Misc., ii, p. 152, pl. 119 (*peronii*).

1818. Latreille, Encycl. Meth., pl. 320, fig. 1.

1818. Péron in Lamarck, anim. sans Vert., v, p. 213 (*Scyllarus i.*).

1825. Desmarest, Consid. Crust., p. 183, pl. 31, fig. 2 (*peronii*).

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 287, pl. 24, fig. 10 (*peronii*).

1893. Stebbing, Hist. of Crust., fig. 16 (p. 194) (after Desmarest).

1910. *Id.*, *l. c.*, p. 373 (*verdi*, non Bate).

1918. Barnard in Gilchrist, Mar. Biol. Rep., iv, p. 53 (*verdi*, non Bate, quoted from Stebbing, 1910).

1921. Gilchrist, Fish. Mar. Biol. Surv. Rep., i, *passim* (localities).

1922. *Id.*, *ibid.*, ii, *passim* (localities).

1923. Stebbing, *l. c.*, p. 6, pl. 13 (*peronii*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 123 (*peronii*).

1927. Hale, Crust. S. Austral., pt. 1, p. 70, fig. 68.

1928. C. von Bonde, Fish. Mar. Biol. Surv. Rep., v, *passim* (localities).

1932. *Id.*, *ibid.*, ix, *passim* (localities).

1938. Ramadan, John Murray Exp. Rep., v, p. 128.

Dorsal surface of carapace and abdomen closely pitted; ventral surface of lateral expansions of carapace setose. Anterior margin of carapace with 6–7 teeth (some of them sometimes with an accessory denticle) between orbit and the large antero-lateral tooth; no second tooth between latter and cervical groove; behind cervical groove 7 teeth, decreasing in size posteriorly. The 2 points of the rostrum dentiform. Medio-dorsal keel with 4 blunt points. Anterior margin of terminal joint of ant. 2 with 3 large teeth followed externally by 3–4 smaller ones, a small denticle on inner margin; no sexual difference (contrast *verdi* Bate, *Challenger* Rep., xxiv, pl. 8). Dactyl of 3rd–5th legs (♂ ♀) somewhat flattened on outer surface and densely fringed on both margins with setae; apical process of 6th joint of 5th leg ♀ scarcely half the length of dactyl (contrast *verdi* Bate, *l. c.*).

Length (incl. rostrum) up to 142 mm., width 118 mm. (Hale's measurement 210 mm. probably includes antennae). Dull salmon-red with darker spots, end of tail-fan yellowish (Hale).

Localities.—Off East London, 45 fathoms (Stebbing), and off Natal coast, 130 fathoms; Portuguese East Africa (25° 24′ S., 33° 25′ E.; 26° 3′ S., 33° 4′ E.), 290–310 metres (Barnard); Umvoti to Durban area of Natal coast, 100–200 fathoms (Fishery Survey).

Distribution.—Southern Australia; Chile (Valparaiso: de Man).

Gen. Thenus Leach

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 64.

1916. de Man, *l. c.*, p. 66 (listed).

1936. Gurney, *l. c.*, p. 432 (*Phyllosoma* sed genus ?).

Gills 21. Margin of carapace indented, but not incised, at the cervical groove. 4th joint of mxp. 3 not inflated, not cristate. 5th leg ♀ simple, not chelate.

Remarks.—The genus contains a single species.

Thenus orientalis (Lund)

Fig. 104, *e*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 849.

1915. Stebbing, *l. c.*, p. 65 (references).

1918. Barnard in Gilchrist, Mar. Biol. Rep., iv, p. 52.

1926. *Id.*, Trans. Roy. Soc. S. Afr., xiii, p. 121.

1928. C. von Bonde, Fish. Mar. Biol. Surv. Rep., v, *passim* (localities).

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 58, pls. 14, 15.

1946. Holthuis, *l. c.*, p. 106 (references).

[Not Stebbing, 1920. =*Scyllarus martensii*.]

Dorsal surface of carapace and abdomen closely studded with flattened granules or tubercles, on abdominal segments 1–5 more or less in transverse lines; the interstices filled with short dense pile. Abdominal segments 2–5 with slight median ridge, which ends in a sharp projecting point on 5th segment. Dactyls of last 3 pairs of legs densely fringed with setae on both margins.

Length (from middle of rostral notch) up to 139 mm., width 81 mm.

Localities.—Mozambique (Hilgendorf); Natal, 26 fathoms (Stebbing); Delagoa Bay (Barnard); Umvoti to Durban area of Natal coast, 100–200 fathoms (Fishery Survey).

Distribution.—Mauritius, Red Sea, Persian Gulf, Indian Seas, East Indies, W. and N.W. Australia, Kermadec Is., China.

Gen. Parribacus Dana

1852. Dana, Proc. Ac. Nat. Sci. Philad., vi, p. 14 (*fide* Neave, Nom. Zool.).

1916. de Man, Siboga Exp. monogr., xxxix*a*, p. 93, also p. 66.

Parribacus ursus major (Herbst)

1793. Herbst, Krabb. u. Krebse., ii, p. 82, pl. 30, fig. 2 (*Cancer* (*Astacus*) *u.m.*).

1852. Dana, U.S. Expl. Exp. Crust., i, p. 517, pl. 32, fig. 6 (*P. antarcticus* Lund).

1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, p. 897, pl. 18, fig. 5 (*P. papyraceus*).

1916. de Man, *l. c.*, p. 93.

1917. Parisi, Atti Soc. ital. Sci. Nat., lvi, p. 13, fig. (juv.).

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 54, pl. 13 (references).

Length 7–8 inches (M. Edwards); about 9 inches (according to Boone's figure).

Locality.—Ifafa Beach, Natal, a young specimen, total length about 60 mm., carapace 23 mm., 1947 (submitted by Zoology Department, Rhodes University College, Grahamstown).

Distribution.—Indo-Pacific to Mauritius and Réunion, but not hitherto recorded from the Red Sea or east coast of Africa. Also Caribbean Sea and coast of Brazil.

Phyllosoma Stage.

1818. Leach in Tuckey, Narr. voy. R. Zaire, App. iv, p. 417, pl. (*Phyllosoma laticorne*).

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, pp. 95–100, pl. 12, B, C, D.

1895. Hornell, J. Mar. Zool., i, p. 69.

1930. Willem von Bonde, Fish. Mar. Biol. Surv. Rep., viii, Spec. Rep. 1, pp. 27–36, pls. 4–7, 12–14.

As remarked on p. 562, footnote, there is no certain way as yet of correlating the several described Phyllosomas with particular genera, to say nothing of the species, in this family.

In the South African Museum there is a very large Scyllarid *Phyllosoma* which was found washed up on Durban beach in June 1930 (fig. 104, *f*). Length from between eye-stalks to end of telson 42 mm., from buccal mass to end of telson 25 mm., from last thoracic ganglion to end of telson 15 mm., from base of 5th leg (laterally) to end of telson 9 mm., median length of cephalic shield 26 mm., greatest width 34 mm., width between bases of 3rd legs 15 mm., between 5th legs 10 mm., telson length 3 mm., basal width 5 mm. The specimen corresponds with W. von Bonde's 17 mm. specimen (*l. c.*, pl. 7), but has a broader cephalic shield; exopod on mxp. 2 very minute, telson with a strong spine on each lateral margin. Gills: mxp. 3 to 5th leg resp. 4, 4, 5, 5, 5, 1.

Family ERYONIDAE.

1901. Alcock, Cat. Ind. Deep-sea Crust., p. 164.

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, pp. 1 *sqq.*

1917. Bouvier, Res. Sci. Camp. Monaco, fasc. 50, pp. 26 *sqq.* (10th May).

1917. Stebbing, Ann. S. Afr. Mus., xvii, p. 27 (18th May).

1923. Stephensen, Dana Exp. Rep., vii, pp. 64, 65.

1925. Balss, D. Tiefsee Exp., xx, p. 189.

1939. Boas, K. Dansk. Vidensk. Selsk. Biol. Medd., xiv, 7, pp. 1–32, figs.

Carapace dorsally flattened, with sharp lateral margins; in the post-larval stages inflated and globose; hind margin gripped (in adult) between 2 lobes both on 1st abdominal segment. All legs 7-jointed, but 2nd and 3rd joints fused, without independent movement. Pleopod 1 uniramous; 2nd–5th pleopods biramous, with appendix interna bearing coupling-hooks at its apex, pleopod 2 ♂ in addition with appendix masculina. Tail-fan not softer (membranous) behind than before, without sutures.

Development.—The opinion has been expressed that the species of the "genus" *Eryoneicus* are the post-larval stages, corresponding with *Puerulus*, *Nisto*, *Pseudibacus* of the *Palinuridae* and *Scyllaridae*; for discussion see Bouvier, 1917. Although Bouvier declined to accept this view, the observations of Balss and Calman (*l. c.*, *infra*, 1925) leave very little doubt that *Eryoneicus* is the post-larval stage (fig. 105, *h*).

Boas was of the same opinion; and also claimed (1879, 1880, and 1939) that the well-known larval form *Amphion* might be the earlier stage of *Polycheles* (sensu lato) corresponding with the *Phyllosoma* of the *Palinura* (fig. 105, *g*). This latter view does not find favour with Balss (1925) or with Gurney (1924 and 1936, *l. c. infra*). Gurney (1936, p. 393) makes a slight slip in calling *Eryoneicus* the "larva" of *Polycheles*, instead of the post-larva.

Key to the Genera.

1. Carapace dorsally flattened, not greatly wider than abdomen (adult).
   - *a*. Eye-stalks fixed in deep incisions of front border of carapace (fig. 105, *a*). Thumb of 1st chela without tooth.
     - i. Epipod of mxp. 3 of fair size, those of the legs normal, ascending into branchial chamber . . . *Polycheles.*
     - ii. Epipod of mxp. 3 a mere papilla, those of the legs merely membranous expansions of their podobranchs . . . . . *Stereomastis.*
   - *b*. Eye-stalks fixed beneath and parallel with front border of carapace. Thumb of 1st chela with subapical tooth . . . . . [*Willemoesia*].
2. Carapace inflated, globose, abruptly wider than abdomen (post-larval stage) (fig. 105, *h*) . . . . . *Eryoneicus.*

Bate (1888, *Challenger* Rep., xxiv, pp. 164, 169) records a specimen of *Willemoesia* from the neighbourhood of Tristan d'Acunha, and the genus may later be found to occur in South African waters.

Gen. Polycheles Heller

1901. Alcock, *l. c.*, p. 171 (*Pentacheles*).
1916. de Man, *l. c.*, pp. 5, 21.
1917. Bouvier, *l. c.*, p. 34 (part).
1917. Stebbing, *l. c.*, p. 28.

Lateral borders of carapace armed with usually more than 20 spines, medio-dorsal keel usually double. First abdominal segment without 2 spines near outer end of anterior border. Chela on 5th leg feebly developed in ♂ compared with ♀.

Remarks.—In repose the elongate 1st pair of legs are carried folded under the carapace in a shallow groove between the lateral margin of carapace and a slight ridge running lengthwise across the pterygostomial region, the tip of the chela just reaching the anterior corner of carapace, and the "elbow" (junction of 4th and 5th joints) projecting freely behind.

Key to the South African Species.

1. One rostral spine. Each orbital sinus divided by a serrate lobe stretching across from inner border . . . *typhlops.*
2. Two rostral spines. Orbital sinuses not divided (fig. 105, *a*).
   a. No large spines on carapace except on lateral margins and median keel . . . . . *granulatus.*
   b. Scattered large spines both in front of and behind cervical groove . . . . . *demani.*

Polycheles typhlops Heller

1862. Heller, SB. Ak. Wiss. Wien, xlv, p. 392, pl. 1, figs. 1–6.
1894. Alcock, Ann. Mag. Nat. Hist. (6), xiii, p. 237, and 1895, Illustr. Zool. R.I.M.S. "Investigator," pl. 10, figs. 2, 2, *a–c* (*hextii*).
1901. *Id.*, *l. c.*, p. 172.
1914. Selbie, Fish. Irel. Sci. Invest., p. 12, pl. 1, figs. 1–13.
1916. de Man, *l. c.*, p. 24 (references).
1917. Bouvier, *l. c.*, p. 36, pl. 2, figs. 1–6.
1923. Stephensen, *l. c.*, p. 67.
1925. Balss, *l. c.*, pp. 197, 201, figs. 1–4, 12–14, and pl. 19.
1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 18.
1938. Ramadan, John Murray Exp., v, p. 124.

Carapace pilose, with sharp granules and spinules in addition to the larger spines on the keels; lateral margin with 7 or 8+5 spines in front of cervical groove, and (14) 18–28 behind; one spine on inner orbital angle, several on outer orbital angle; one spine on eye-stalk; hind margin of carapace spinose. Abdominal segments with serrate edges, surface more or less granular; median keel on 1st segment feeble, on 6th double and granulate, on 2nd–5th raised into a sharp antrorse spine; basal keel and the 2 distal keels on telson granulate. Basal joint of ant. 1 with 2 spines on outer distal angle, inner margin serrate.

Length ♀ up to 113 mm., carapace 49 mm. (de Man). Rose-red (Bouvier's coloured figure).

Locality.—Off Natal coast (Durban area), 270 fathoms (Calman).

Distribution.—N. Atlantic, Mediterranean, Arabian and Indian Seas, East Indies.

Polycheles granulatus Faxon

1894. Alcock, *l. c.*, p. 236, and Illustr. "Investigator," pl. 8, fig. 3 (*beaumontii*).

1895. Faxon, Mem. Mus. Comp. Zool. Harv., xviii, p. 123, pl. 32, fig. 1, pl. 33, figs. 2, 2, *a*.

1901. Alcock, *l. c.*, p. 175 (*beaumontii*).

1906. Rathbun, Bull. U.S. Fish. Comm., 1903, pt. 3, p. 899, fig. 54 (antennal scale).

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 11.

1917. Bouvier, *l. c.*, p. 45, pl. 2, figs. 7–14.

1923. Stephensen, *l. c.*, p. 67.

Carapace pilose, smooth or merely granulate between the lateral margins and median keel; lateral margin with 8 to 10+3 or 4 spines in front of, and 13–14 behind cervical groove; one spine on both inner and outer angle of orbital sinus; one spine on eye-stalk projecting forwards. Keels on abdominal segments 1–5 not notched, 1st–3rd with short forwardly-directed points. Basal joint of ant. 1 with spine on outer distal angle, inner margin turned upwards (against its fellow), serrate, ending in a long spiniform point.

Length up to 39 mm., carapace 20 mm. (Alcock: 80 and 36 resp.; Bouvier: ♂ 88 and 40 mm., ♀ 117 and 49 mm. resp.). Rose-red.

Locality.—Off Cape Point, 480–600 fathoms (Stebbing).

Distribution.—Gulf of Panama, Hawaiian Is., Ceylon, south-west coast of Ireland, Madeira, Canary Is. and Azores.

Polycheles demani Stebb.

Fig. 105, *a–c*.

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 25 (? *beaumontii*).
1910. *Id.*, *l. c.*, p. 377 (? *beaumontii*).
1916. de Man, *l. c.*, p. 5, footnote 2.
1917. Stebbing, *l. c.*, p. 28, pl. 3 (Crust., pl. 92).
1925. Calman, *l. c.*, p. 17.

Carapace pilose, smooth or granulate and with large spines scattered over the area between lateral margins and median keel; lateral margin with 7 or 8 (9) + 4 spines in front of, and 19–26 behind cervical groove; one spine on inner angle of orbit, one or two (symmetrical or asymmetrical) on outer angle; one spine on eye-stalk. Keels on abdominal segments 1–5 not notched, 1st to 3rd or 4th with short forwardly-directed points. Basal joint of ant. 1 with spine on outer distal angle, inner margin turned upwards, serrate, ending a sharp spiniform point.

Length ♂ up to 140 mm., ♀ 134 mm. (carapace 64 and 60 mm. resp.).

Localities.—Off Cape Point, 500–1400 fathoms (Stebbing, Calman, and S. Afr. Mus.).

Remarks.—Fifteen or sixteen specimens were obtained by the s.s. *Pieter Faure*, of which 9 are now in the South African Museum, including the original ♂ and ♀ described in 1908 by Stebbing, but not the ♀ figured in 1917. The 2 spines on outer angle of orbit are not constant and cannot be regarded as a specific character. Stebbing in 1908 said there were 2 spines on outer side of the large 1st joint of ant. 1; none of the specimens has more than one, but a tuft of matted hair may have been mistaken for a spine; the 1917 figure is not clear on this point; Calman also found only one spine in his specimens.

The larger ♀♀ have a triangular glandular patch between the bases of 4th and 5th legs, as described for *P. phosphorus* Alcock (1901, p. 169). As preserved the texture of this brown substance is very similar to that of the coagulated sperm which sometimes protrudes from the openings of the vasa deferentia. May not the deep hollow in the ♀ form a receptaculum seminis?

Gen. Stereomastis Bate

1901. Alcock, *l. c.*, p. 166 (*Polycheles*, non Heller).
1916. de Man, *l. c.*, pp. 4, 7.
1917. Bouvier, *l. c.*, p. 34 (*Polycheles* part).
1917. Stebbing, *l. c.*, p. 29.

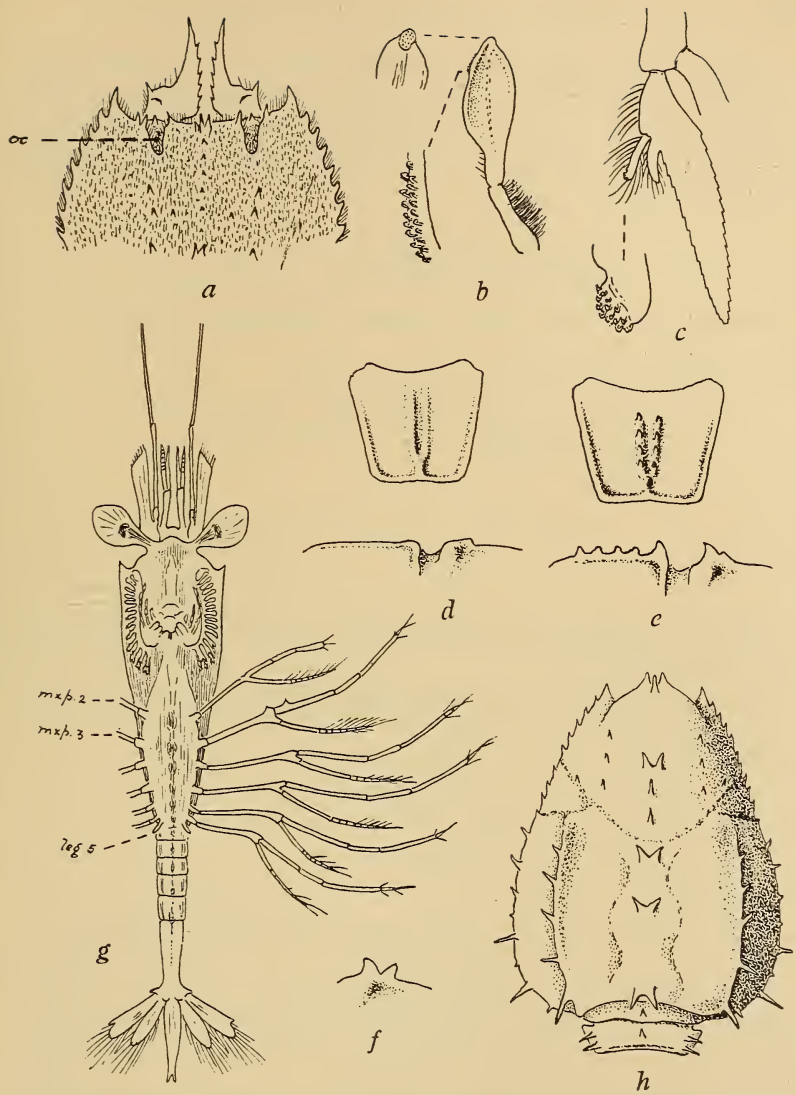


Fig. 105.—*Polycheles demani* Stebb. *a*, front of carapace (asymmetrical), and bases of 1st antennae. *b*, ventral view of pleopod 1 ♂, with scabrous apex in dorsal view and portion of row of coupling-hooks further enlarged. *c*, endopod of pleopod 2 ♂, with apex of appendix interna further enlarged, setae and exopod omitted.

Stereomastis sculpta (S. I. Smith). *d*, dorsal view of 6th abdominal segment, and profile of 6th segment and base of telson.

Stereomastis nana (S. I. Smith). *e*, the same.

Stereomastis suhmi (Bate). *f*, profile of base of telson.

Amphion larval stage. *g* (copy after Boas, 1939).

Eryoneicus faxoni Bouv. = larval stage of *Stereomastis sculpta*. *h* (copy after Bouvier, 1917).

Lateral borders of carapace constantly with fewer than 20 spines, medio-dorsal keel with a definite number of 4–7 spines; 1st abdominal segment with 2 spines on anterior margin near outer end (except *S. cerata* (Alck.)). Other characters as in *Polycheles*, except epipods, for which see key.

Key to the South African Species.

1. Grooved ridge on 6th abdominal segment low and uniform (fig. 105, *d*) . . . . . *sculpta.*
2. Grooved ridge with high, dentate edges (fig. 105, *e*).
   a. Antrorse spines on abdominal keels simple. . . . *nana.*
   b. Antrorse spines on segments 2–5 with a subsidiary denticle on hind slope . . . . . *suhmi.*

Stereomastis sculpta (S. I. Smith)

Fig. 105, *d*.

1882. S. I. Smith, Bull. Mus. Comp. Zool. Harvard, x, p. 23, pls. 3, 4 (*Pentacheles s.*).

1910. Stebbing, *l. c.*, p. 377 (*Polycheles s.*) (date of Stebbing, S. Afr. Crust., pt. 2, for 1882 read 1902).

1916. de Man, *l. c.*, p. 8.

1917. Bouvier, *l. c.*, p. 51, pl. 3, fig. 1.

1917. Stebbing, *l. c.*, p. 30.

1923. Stephensen, *l. c.*, p. 66.

1925. Balss, *l. c.*, p. 201.

1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 18.

Median keel with 2 (rostral), 1, 2, 1 (♀ 2, 1, 1, 2, 1) spines in front of cervical groove, and 2, 1, 2 (in one juv. specimen 2, 2, 2) spines behind (*cf.* fig. 105, *h*); sublateral keel on branchial region with 5 spines, lateral margin with 5 or 6 + 3 in front of cervical groove, 6–8 behind. Inner orbital angle with a spine in ♂ (absent in ♀); spine on eye-stalk. Outer distal angle of basal joint of ant. 1 with 2 spines, inner margin smooth. Abdominal segments 1–5 with keels forming antrose spines, increasing in size from 1st to 4th, 5th smaller; 6th segment with a low sulcate groove, non-dentate; telson with very slight median keel at base.

Length ♀ up to 128 mm., ♂ 96 mm.

Localities.—Off Cape Natal (Durban), 440 fathoms (Stebbing); off Cape Point, 537–600 fathoms (Calman).

Distribution.—N. Atlantic, Mediterranean, Arabian Sea, East Indies, west coast of N. America.

Remarks.—In the s.s. *Pieter Faure* collection in the South African Museum there are 3 Cape Point specimens, including a 72 mm. ♀ and 2 juv. of 45 mm., which were taken in the same locality (in one case in the same haul) as numerous specimens of the following species (*nana*); they are assigned to *sculpta* on account of the ornamentation of the 6th abdominal segment. The ♀ has a triangular glandular patch between the bases of the last legs.

Stereomastis nana (S. I. Smith)

Fig. 105, *e*.

1910. Stebbing, *l. c.*, p. 377 (*Polycheles n.*).
1917. *Id.*, *l. c.*, p. 30.
1925. Calman, *l. c.*, p. 19.

Similar to *sculpta*, but median keel with 2, 1, 1, 2, 1 spines in front of, and 2, 2, 2 behind, cervical groove (12 specimens); 2 specimens with respectively 2, 1, 1, 2, 1, 1 and 2, 2, 2; one specimen with 2, 1, 1, 1, 1 and 2, 2, 2; one with 2, 1, 2, 1 and 2, 2, 2; abdominal segments 1–5 with the antrorse spines slightly stronger, the 5th at least as large as 4th (in one case 1st spine obsolete), sulcate keel on 6th segment with several sharp denticles on each side, with a prominent upstanding tooth behind; basal keel on telson with an upstanding or antrorse tooth, with a subsidiary denticle on its hinder slope. Pleopods 1 and 2 as in *demani* (fig. 105, *b*, *c*).

Length ♂ up to 54 mm., ovig. ♀ 65 mm. (carapace resp. 24 and 27 mm.).

Localities.—Off Cape Point, 750–800 fathoms (Stebbing); the same, 580–1200 fathoms (Calman); the same, 210–900 fathoms (S. Afr. Mus.).

Distribution.—East and west coasts of N. America. If *grimaldii* Bouv. be regarded as a variety the distribution extends to the eastern Atlantic.

Remarks.—The ovigerous ♀ and larger ♀♀ have the glandular patch between the bases of the last legs.

It has been suggested that *nana* is a dwarf deep-sea form of *scuplta*, but this does not seem to be supported by the bathymetrical distribution of the two forms.

Stereomastis suhmi (Bate)

Fig. 105, *f*.

1878. Bate, Ann. Mag. Nat. Hist. (5), ii, p. 278 (*Pentacheles s.*).
1888. *Id.*, Rep. H.M.S. *Challenger*, xxiv, p. 154, pl. 15, figs. 3, 4.
1920. Sund, Ann. Mag. Nat. Hist. (9), vi, p. 223.
1925. Calman, *l. c.*, p. 19, pl. 3, fig. 9.

Differs from *nana* in the spine formula for the median keel on carapace, viz. 2, 1, 1, 2, 2, 1 in front of, and 2, 2, 2, 2 behind cervical groove. The lateral spines number 5 + 2 or 3 in front of, and 8–9 behind cervical groove. Antrorse spine on 5th abdominal segment as large as that on 4th; spines on 2nd–5th segments each with a subsidiary denticle on its hind slope. Basal median keel of telson with 2 subequal divergent denticles one behind the other.

Length ♀ up to 47 mm. (carapace 20 mm.) (*Challenger* ♀ 50 mm. total).

Localities.—Off Cape Point, 1200 fathoms (Calman); same locality, 800 fathoms (S. Afr. Mus.).

Distribution.—West coast of Patagonia, 160–245 fathoms.

Remarks.—Exceedingly close to *nana*, but distinguished by the bifid antrorse spines on abdominal segments.

Amphion and *Eryoneicus* Stages.

1882. Bate, Ann. Mag. Nat. Hist. (5), x, p. 457.
1888. *Id.*, *Challenger* Rep., xxiv, pp. 122–126 (*Eryoneicus*) and pp. 901–918 (*Amphion*).
1901. Alcock, *l. c.*, p. 176 (*Eryonicus*, sic).
1915. Sund, Nature, xcv, June 3, p. 372 (*Eryoneicus*).
1917. Bouvier, *l. c.*, p. 54 (*Eryoneicus*)..
1924. Gurney, "Terra Nova" Rep., zool., viii, p. 104 (*Amphionidae*).
1925. Calman, *l. c.*, pp. 18–21 (*Eryoneicus*).
1936. Gurney, "Discovery" Rep., xii, p. 392 (*Amphionidae*).
1939. Boas, *l. c.*, pp. 24–29, figs. 11, 12 (*Amphion*, *Eryoneicus*).

Key to Eryoneicus *Forms correlated with Adults found in South Africa.*

The flat-topped papillae are not included in the following spine formulae; *c* = cervical groove.

1. Whole carapace covered with numerous spines . . . *kempi.*
2. Spines only on the keels on carapace:
   a. Spines on median keel: 2, 1, 2, 1, 1, *c* 2, 2, 2 . . *caecus* (*faxoni*).
   b. „ „ : 2, 1, 1, 2, 1, *c* 2, 2, 2 . . *hibernicus.*
   c. „ „ : 2, 1, 1, 2, 2, 1, *c* 2, 2, 2, 2 . *suhmi.*

Eryoneicus kempi Selbie = *Polycheles typhlops.*

1914. Selbie, Fish. Irel. Sci. Invest., p. 37, pl. 5, figs. 3–8.
1915. Sund, *l. c.*, p. 372.
1923. Stephensen, *l. c.*, p. 66.

Eryoneicus caecus Bate and *faxoni* Bouv. = *Stereomastis sculpta.*

Fig. 105, *h.*

1888. Bate, *l. c.*, p. 122, fig. 30, and pl. 12, E (*caecus*).
1905. Bouvier, C.R. Ac. Paris, cxl, p. 482 (*faxoni*).
1914. Selbie, *l. c.*, p. 29, pl. 4, figs. 1–5.
1917. Bouvier, *l. c.*, p. 78, pl. 4, figs. 14, 15, pl. 5, figs. 13–16 (*faxoni*).
1920. Sund, Ann. Mag. Nat. Hist. (9), vi, p. 220 (*caecus*).
1923. Stephensen, *l. c.*, p. 66 (*faxoni*).
1925. Calman, *l. c.*, p. 18.
Length 37 mm.
Locality.—Off Cape Point, 790 fathoms (Calman).

Eryoneicus hibernicus Selbie = *Stereomastis nana.*

1914. Selbie, *l. c.*, p. 33, pl. 5, figs. 1, 2.
1915. Sund, *l. c.*, p. 372.

Eryoneicus Stage = *Stereomastis suhmi.*

1925. Calman, *l. c.*, p. 20, pl. 4, fig. 10.
Length 26 mm.
Locality.—Off Cape Point, 790 fathoms (Calman).

NATANTIA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 469 (key to tribes).
1909. Calman, Lankester's Treatise, Zool., vii, p. 310.
The 5 pairs of abdominal appendages well developed, and used for swimming.

Key to the Divisions.

1. Third pair of legs chelate (except in genera in which the legs are much reduced). Pleurae of 1st abdominal segment not overlapped by those of 2nd segment (figs. 106, 119, *c*). Abdomen without sharp bend or hump.
   a. One or both legs of the 3rd pair longer and stouter than 1st and 2nd pairs. 1st pair of abdominal appendages ♂ not forming a petasma. Eggs carried by ♀ attached to the pleopods . . . . *Stenopodidea*, p. 576.
   b. Third pair of legs not longer or stouter than 1st and 2nd pairs. 1st pair of abdominal appendages ♂ forming a petasma (p. 580, figs. 107–120). Eggs shed loose into sea . . . . . *Penaeidea*, p. 579.
2. Third pair of legs not chelate. Pleurae of 1st abdominal segment overlapped by those of 2nd segment (figs. 128, 131, 147, 150). Abdomen usually with a sharp bend or hump (figs. 128, 131, 147). 1st pair of abdominal appendages ♂ not forming a petasma. Eggs carried by ♀ attached to the pleopods . . . . . *Caridea*, p. 646.

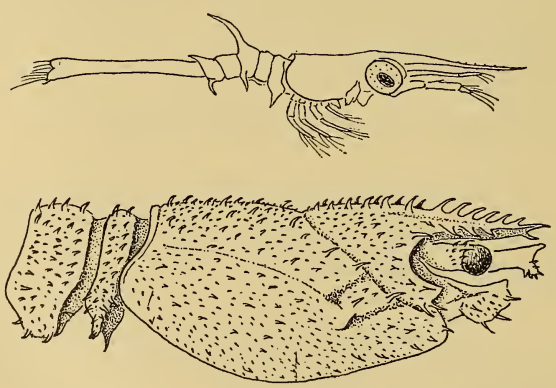


Fig. 106.—*Stenopus hispidus* (Olivier). 1st larval stage (copy from Gurney), and lateral view of carapace and first two abdominal segments of adult.

STENOPODIDEA.

1907. Borradaile, *l. c.*, p. 469 (Stenopides).

1909. Calman, *l. c.*, p. 311.

1924. Gurney, "Terra Nova" Rep., zool., viii, pp. 139–141 (affinities).

1946. Holthuis, Decap. Macrura Snellius Exp. Temminckia, vii, p. 2.

Abdomen without sharp bend or hump; pleura of 1st segment not overlapped by those of 2nd segment. Ant. 1 without spiniform projection (stylocerite). Mandibular palp curved inwards. Mxp. 1 without lobe at base of exopod, endopod short; mxp. 2 with terminal joints normal (contrast *Caridea*); mxp. 3 with 7 joints. First 3 pairs of legs chelate; one or both of the 3rd pair longer and much stouter than 1st and 2nd pairs. 1st pleopods ♂ not forming a petasma (see *Penaeidea*); no appendix interna on any of the pleopods; pleopod 1 ♀ without endopod. Gills trichobranchiate. Eggs carried by ♀ attached to the pleopods. First larval stage is a *Zoea*.

Remarks.—One family comprising seven described genera.

Gurney (1924) comes to the conclusion that "on the evidence of the adult structure *Stenopus* holds a position between the *Penaeidea* and the *Homaridea*," and that as regards its development it should be included in the *Reptantia*, near to the *Laomediidae* and *Anomura*.

Family STENOPODIDAE.

1901. Alcock, Cat. Ind. Deep-sea Macrura, p. 143 (deep-sea genera).
1917. Stebbing, Ann. Durban Mus., i, p. 440.
1946. Holthuis, *l. c.*, p. 4 (key to genera).

Key to the South African [and Mauritian] Genera.

1. Body compressed. Endopod of uropod with 2 dorsal ridges, a median one and an inner weaker one . . . *Stenopus.*
2. Body depressed. Endopod of uropod with a single median ridge . . . . . [*Microprosthema*].

Microprosthema Stimpson 1860 (syn. *Stenopusculus* Richters 1880) is represented at Mauritius by 2 species: *validum* Stmpsn. and *plumicorne* (Richters). (See Holthuis, *l. c.*, 1946.)

Gen. Stenopus Latr.

1825. Latreille in Desmarest, Consid. gen. Crust., p. 226.
1917. Stebbing, *l. c.*, p. 440.
1936. Gurney, "Discovery" Rep., xii, pp. 380 *sqq.* (larval stages).
1941. Lebour, J. Linn. Soc. Lond., xli, p. 161, figs. 20–26 (larval stages).
1946. Holthuis, *l. c.*, p. 5 (key to species).

Eyes present. Rostrum long. Carapace and abdomen spinose. Antennal scale long, flat. Endopod of mxp. 1 3-jointed; exopod of

mxp. 3 well developed. 3rd leg with 5th joint of fair length, 6th joint slender (except *robustus* Borrad. 1910). 4th and 5th legs with 5th and 6th joints multiarticulate, dactyls short, biunguiculate. Telson pointed. Gills 19 + 7 epipods (Bouvier, Holthuis) or 21 + 7 epipods (Gurney, 1924).

Stenopus hispidus (Olivier)

Spiny Shrimp.

Fig. 106.

1893. Herrick, Mem. Nat. Ac. Sci., v, pp. 326, 339, pls. 5–13.

1901. Rathbun, Bull. U.S. Fish. Comm. [1900], xx, p. 99, pl. 2 (synonymy).

1917. Stebbing, *l. c.*, p. 440 (references).

1924. Gurney, *l. c.*, p. 133 (larval stage).

1927. Boone, Bull. Bingham Ocean. coll., i, p. 82 (colour).

1930. McNeill and Ward, Rec. Austral. Mus., xvii, p. 360.

1936. Gurney, *l. c.*, pp. 380, 391, figs. 1–3 (larval stages).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 95, figs. 14, 15.

1941. Lebour, *l. c.*, p. 175, figs. 24–26 (larval stages).

1946. Holthuis, *l. c.*, p. 12, pl. 1, figs. *a–g* (references).

Rostrum extending scarcely beyond apex of 1st joint of ant. 1; 3 (main) outstanding lateral spines, 5–6 medio-dorsal spines (excl. apical point) followed by 5–6 pairs of spines back to cervical groove, 1 subapical ventral spine. Medio-dorsal length of raised spinose portion of abdominal segment 2 much greater than that of anterior smooth portion, with numerous rows of spines. Abdominal segments 4 and 5 with numerous adpressed spines arranged obliquely and radiately on either side of smooth median stripe, leaving only a small area bare of spines at bases of segments. Abdominal segment 6 with numerous spines arranged in longitudinal or slightly oblique rows. Telson with 6–7 lateral spines (excl. the one at each corner of narrow apex). A medio-ventral spiniform tubercle on abdominal segments 1–5 in ♂, on segment 5 only in ♀; ventral surface of 6th segment closely covered with numerous spines and spinules. Longest spines on eye-stalk scarcely extending half-way over the cornea. All ridges on 4th–6th joints of 3rd leg (incl. lower ridges on 6th joint, and lower edge of thumb) with strong, regularly and closely-set, curved spines.

Length (incl. rostrum) ovig. ♀ up to 61 mm., 3rd leg 70 mm. (S. Afr. Mus.). White or pellucid, with carapace in front of cervical groove, rostrum, 3rd and 6th abdominal segments, and telson crimson or

violaceous; sternum claret, bases of legs violaceous; legs white banded with yellow or orange; antennae white.

Localities.—Durban (Stebbing, and S. Afr. Mus.); off Pondoland coast, Agulhas Bank, and S.W. of Cape Point (35° S., 17° 49′ E.) (Gurney: larval stages).

Distribution.—Madagascar, east coast of Africa, Chagos, Indo-Pacific; West Indies.

Remarks.—According to Gurney the larva is distinguished by having a medio-ventral hook on 5th abdominal segment, a medio-dorsal spine on 3rd abdominal segment, and the rostrum smooth or with minute spinules.

Both rami of the 2nd–4th pleopods in the ovigerous ♀ are very large and arch over towards the middle line, forming a loose kind of brood-pouch, which is closed fore and aft by the 1st and 5th pleopods respectively. The eggs are very numerous, approximately ·75 mm. in diameter.

Possibly *tenuirostris* de Man (1887, Arch. Naturg., liii, p. 567, pl. 22, *a*, fig. 5) (Amboina, 25 mm. in length, ♂♂♀♀) may prove to be the not fully-grown form of *hispidus*, especially as de Man (1902, Abh. Senckenb. Ges., xxv, p. 761) has described *tenuirostris* var. *intermedius* combining features of both "species." *S. tenuirostris* has a longer rostrum with 3, 4, 5 or even 9 spines on the ventral edge, and longitudinal rows of spinules on legs 1, 2, 4 and 5 (see Holthuis, *l. c.*, 1946).

PENAEIDEA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, pp. 469, 470 (Penaeides).

1909. Calman, Lankester's Treatise, Zool., vii, p. 310.

1924. Gurney, "Terra Nova" Rep., zool., viii, pp. 48 *sqq.* (larval forms).

Abdomen without sharp bend. Pleurae of 2nd abdominal segment not overlapping those of 1st segment. Antenna 1 usually with stylocerite. Mandibular palp straight. Mxp. 1 without lobe at base of exopod, endopod long; mxp. 2 with terminal joints normal (contrast *Caridea*); mxp. 3 with 7 joints. First 3 pairs of legs chelate (except when the legs are much reduced), 3rd pair not stouter than 1st and 2nd pairs. 1st pleopods ♂ forming a petasma (see below); no appendix interna on any of the pleopods, but an appendix masculina (uni- or bi-lamellate) on plepood 2 ♂; endopod of pleopod 1 ♀ reduced

or absent. Gills dendrobranchiate (absent in *Leuciferidae*). Eggs not carried by ♀.

Remarks.—The eggs are shed loose into the sea. The 1st larval stage is a *Nauplius*, successive stages being *Metanauplius*, *Protozoea*, *Zoea*, *Metazoea*, and the *Mysis* (or Schizopod) stage. In the *Sergestidae* the first larval stage is the *Protozoea*.

The petasma (andricum or curtain) formed by the 1st pleopods of the ♂ functions as a kind of scoop or channel for the transmission of the sperm or spermatophores to the ♀. The thelycum (spermatheca or receptaculum seminis) of the ♀ receives and stores the sperm or sperm-packets; it may be simple or rather complicated in structure.

Alcock and Borradaile arrange the Penaeides in 2 families: *Penaeidae* and *Sergestidae*, with subfamilies. Calman prefers one family, *Penaeidae*, with subfamilies. For the sake of convenience the present arrangement has three families, one of them with several genera.

Key to the South African Families.

1. Gills numerous. First 3 pairs of legs chelate; 4th and 5th pairs well developed. . . . . *Penaeidae.*
2. Gills few, not more than 8. 1st pair of legs non-chelate; 4th and 5th pairs rudimentary, or reduced, or absent . *Sergestidae.*
3. Gills absent. Head greatly elongate. First 2 pairs of legs non-chelate; 3rd (imperfectly) chelate; 4th and 5th pairs absent (fig. 121) . . . . . *Leuciferidae.*

Family PENAEIDAE.

1901. Alcock, Cat. Ind. Deep-sea Crust., p. 11.

1906. *Id.*, Cat. Ind. Dec. Crust., pt. 3, p. 4.

1907. Borradaile, *l. c.*, p. 470.

1908. Bouvier, Res. Sci. Camp. Monaco, fasc. 33, pp. 9 sqq.

1910. Stebbing, *l. c.*, p. 379.

1911. de Man, Siboga Exp. monogr., xxxix*a*, pp. 5 s*qq.* (list of species to 1910), and plates publ. 1913.

1924. Gurney, *l. c.*, pp. 49 *sqq.* (larval forms).

1927. *Id.*, Trans. Zool. Soc. Lond., pt. 2, pp. 232 *sqq.* (larval forms).

1938. Ramadan, John Murray Exp., v, pp. 141–5 (eye-stalks, structure).

Rostrum laterally compressed, usually well developed. Mxp. 2 with well-developed epipod. Exopods often present on some or all of the legs. Gills numerous, arthrobranchs always present. Petasma sometimes asymmetrical. Thelycum well developed (usually).

Key to the Subfamilies and South African Genera.

I. A foliaceous flexible appendage on inner margin of basal joint of ant. 1 (except in *Macropetasma*, where it is short (fig. 111, *c*). No podobranchs on legs [except *Haliporus* s.s., not S. African].

A. Cervical groove incomplete or absent (figs. 107–112). 1st joint of mandibular palp smaller than 2nd (fig. 107, *h*) (*Penaeinae*).

1. Rostrum dentate on dorsal and ventral edges.*

a. Cutting-process of mandible short, square-cut (fig. 107, *h*) . . . . *Penaeus.*

b. Cutting-process elongate, scythe-like (fig. 112) . . . [*Funchalia* subgen. *Pelagopenaeus*].

2. Rostrum dentate only on dorsal edge.

a. Mxp. 3 without epopod. Carapace without lateral keels. Lateral keel on 6th abdominal segment discontinuous and inconspicuous.

i. Telson grooved. Dorsal keel on at least 4th–6th abdominal segments.

α. Longitudinal and transverse sutures on carapace absent.

* Exopods on all legs. Telson subapically trifid (fig. 108, *d*) . . *Penaeopsis.*

** Exopods absent from 5th leg. Telson not trifid. *Metapenaeus.*

β. Longitudinal and transverse sutures present (fig. 110, *a*, *c*, *f*).

* Exopods absent from all legs. Telson trifid . *Parapenaeus.*

** Exopods on all legs, but epipods absent from at least last 3, sometimes all 5, legs. Telson not trifid . . *Parapenaeopsis.*

ii. Telson not grooved. Dorsal keel only on 6th and hinder part of 5th abdominal segments. Rostrum cultrate . . . . . *Macropetasma.*

b. Mxp. 3 with epipod. Lateral keels on carapace. Lateral keel on 6th abdominal segment continuous. Cutting-process of mandible elongate, scythe-like (fig. 112) . . . . *Funchalia* subgen. *Funchalia.*

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* Caution: abnormal specimens; see Remarks under *P. indicus*, p. 589.

B. Cervical groove reaching dorsum (figs. 113, 115). 1st joint of mandibular palp large, almost or quite equal to 2nd.* A post-orbital (submarginal) spine present (*Solenocerinae*).

1. Flagella of ant. 1 broad, compressed, forming a respiratory channel. 3rd–5th sternites narrow (fig. 113, *b*) . . . . . *Solenocera.*

2. Flagella of ant. 1 not forming a channel. 3rd–5th sternites broad (fig. 115, *b*) . . . *Hymenopenaeus.*

II. No appendage on ant. 1, or only a short rigid scale, not foliaceous.

A. Podobranchs on first 2 or 3 pairs of legs (except *Gennadas* where none behind mxp. 2). Arthrobranchs in a double series (*Aristeinae*).

1. Outer flagellum of ant. 1 short and thickened. Rostrum tri- or multi-dentate, usually long.

a. Rostrum tridentate (2–4). Hepatic spine absent . . . . . *Plesiopenaeus.*

b. Rostrum multidentate. Hepatic spine present . . . . . *Aristeomorpha.*

2. Both flagella of ant. 1 long. Rostrum short, unidentate.

a. No podobranch on mxp. 3 or any of the legs. Only 6th abdominal segment keeled . *Gennadas.*

b. Podobranchs on mxp. 3 and 1st–3rd legs.

i. Exopod of mxp. 1 distally constricted and segmented. Abdominal segments 3–6 keeled . . . [*Benthesicymus*].

ii. Exopod of mxp. 1 not constricted nor segmented. Only abdominal segment 6 keeled . . . . *Bentheogennema.*

B. Podobranchs on mxp. 2 only. Pleopods uniramous (except in a modified form on plp. 1 and 2 ♂). Integument firm. Carapace and abdomen dorsally keeled (*Eusicyoninae*) . . . . *Eusicyonia.*

Gen. Penaeus Fabr.

1906. Alcock, Cat. Ind. Decap. Crust., pt. 3, p. 4 (s. lato), p. 7 (s. restricto).

1910. Stebbing, *l. c.*, p. 380.

1911. de Man, *l. c.*, pp. 10 (list of species) and 95.

1926. Schmitt, Biol. Res. "Endeavour," v, p. 359 (key to Australian and Indo-Pacific species).

1934. Burkenroad, Bull. Amer. Mus. Nat. Hist., lxviii, p. 74.

* Where palp is 3-jointed as in *Hymenopenaeus triarthrus*, read: middle and apical joints instead of 1st and 2nd respectively.

1938. Dakin, Proc. Zool. Soc. Lond., ser. A, pt. 2, pp. 163 *sqq.*, pls. 1–7 (development, habits, *P. plebejus*).

1938. Heldt, Ann. Inst. ocean. Paris, xviii, pp. 45, etc. (reproduction, development).

1940. Dakin, Rec. Austral. Mus., xx, p. 354 (development, additional notes and figures).

As restricted by S. I. Smith (1885) and Alcock (1901): pleurobranch present on 5th leg; no epipods on last 2 legs; exopods present on all legs, or all but the 5th. Gills 19 + 6 epipods (Alcock). Flagella of ant. 1 short. Terminal (7th) joint of mxp. 3 in ♀ inserted apically on 6th joint, *i.e.* normal, terete, setose; in ♂ 6th joint carries apically a pencil of bristles which lie in the grooved and glabrous 7th joint, which is inserted subterminally on 6th (fig. 107, *i*). Appendix masculina on pleopod 2 ♂ scale-like, with marginal spinules (fig. 107, *f*).

Remarks.—Mostly inhabitants of littoral and shallow water, and mostly Indo-Pacific.

Dakin (1938, 1940) has described the life-history of the Australian King Prawn (*P. plebejus* Hess). During the winter small prawns are found in the rivers and lagoons. In September–October they appear nearer the harbour-mouths and in increasing size. From December to the end of summer shoals of large-sized prawns, but with unripe gonads, pass out to sea. The largest-sized prawns with ripe ovaries are only caught well out to sea, where the eggs are laid. The planktonic stages move inshore, and the prawns in the post-*Mysis* and young-prawn stages enter the estuaries and lagoons. They become bottom-dwellers at about 17 mm. in length. It is believed that they spend about twelve months here before descending to the sea for spawning, and that after reaching the sea another six months elapse before they reach sexual maturity. It seems certain that the sexually developed prawns do not re-enter the estuaries after spawning.

Cf. Weymouth, Lindner and Anderson (1932 and 1933), and Burkenroad (1934, *l. c.*, pp. 81–84), for life-history of the American *P. setiferus*. Also Burkenroad, 1939, Bull. Bingham Ocean. Coll., vi, pp. 45 *sqq.*

Key to the South African Species.

I. Lateral grooves on either side of rostrum not extending to hind margin of carapace (fig. 107, *a*, *g*). Rostrum with 2–5 ventral teeth. No post-ocular crest. Telson without lateral spines. Thelycum (♀) of 2 flaps meeting in middle line (fig. 107, *c*).

A. No exopod on 5th leg (fig. 107, *a*). Rostral teeth usually $\frac{7}{3}$ . . . . . *monodon* (incl. *caeruleus*).

B. Exopod on 5th leg (but smaller than preceding ones) (fig. 107, *j*).
1. Subhepatic crest present (*cf.* fig. 107, *a*). Rostral formula $\frac{6-7}{3}$ . . . . . *semisulcatus.*
2. No subhepatic crest (fig. 107, *g*). Rostral formula $\frac{7-8}{4-5}$, rostrum usually extending beyond apex of antennal scale . . . . . *indicus.*

II. Lateral rostral grooves extending almost to hind margin of carapace. Post-ocular crest present (fig. 107, *m*).
A. Coxal joint of 1st–3rd legs with a spine. Telson with lateral spines. Post-ocular crest looped. Rostral formula $\frac{10-11}{1}$ . . . . . [*trisulcatus* Angola].
B. Coxal joints unarmed.
1. Post-ocular crest simple. More than one ventral tooth on rostrum. Telson without lateral spines . . . . . [*duorarum* Angola].
2. Post-ocular crest looped (fig. 107, *m*).
a. Telson without lateral spines. Rostral formula $\frac{10-12}{1}$ . . . . *canaliculatus.*
b. Telson with 3 pairs of lateral spines. Rostral formula $\frac{9-10}{1}$. Thelycum (fully developed) tubular, pouch-like (fig. 107, *n*) *japonicus.*

Burkenroad (1934, p. 76) has pointed out that *P. durbani* Stebb (1917, Ann. Durban Mus., i, p. 442, pl. 22) was incompletely described and figured. It might have been, and probably was, a specimen of *indicus*, but the figure shows a post-ocular tooth and only one ventral tooth on rostrum (but see Remarks under *indicus*, p. 590). Burkenroad also states that *pulchricaudatus* Stebb. (1914, Ann. S. Afr. Mus., xv, p. 14, pl. 3 (Crust., pl. 117)), in spite of its size, is a post-*Mysis* (Sicyonine stage) of probably *japonicus*.

Burkenroad (1939, Bull. Bingham Ocean. Coll., vi, pp. 26 *sqq.*) has divided *P. brasiliensis* Latr. *sensu lato* into three Atlantic and two Pacific species, and renamed the West African form *duorarum* (*l. c.*, p. 31, figs. 18, 19, 23, 25–27).

Penaeus monodon Fabr.

Tiger Prawn.

Fig. 107, *a–f.*

? 1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 843 (*semisulcatus* var. *exsulcatus*).

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 74 (part synonymy).

1905. *Id.*, *ibid.*, p. 77, pls. 21, 21 *bis* (*caeruleus*).

1906. Alcock, *l. c.*, p. 10, pl. 1, fig. 2 (*semisulcatus*, non de Haan).

1910. Stebbing, *l. c.*, p. 380 (*monodon* and *caeruleus*).

1911. de Man, *l. c.*, pp. 99, 100 (*caeruleus*, colour var. of *semisulcatus* de Haan).

1911. *Id.*, *ibid.*, p. 101 (*carinatus* Dana).

1912. Lenz, Ark. Zool., vii, no. 29, p. 5.

1915. Kemp, Mem. Ind. Mus., v, p. 317, fig. 36 (juv.) (*carinatus*).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.

1926. Schmitt, *l. c.*, p. 359 (*carinatus*, in key) and pp. 363, 364.

[not *monodon* Bate, 1888, nor Alcock, 1906. =*semisulcatus* de Haan.]

Rostrum with a more or less distinct double curve, extending to about end of antennal scale (in specimens from about 30 mm. total length upwards), lateral grooves extending backwards scarcely to the hindmost rostral tooth; post-rostral median keel flat-topped with indications of a groove (one or two shallow elongate depressions); usually 7 teeth above, 3 below, sometimes 6 or 8 above, 2 or 4 below. Carapace glabrous; post-antennular spine continued as an oblique ridge to the hepatic spine; above this a ridge and a groove connecting with the feebly defined cervical groove, and at their junction a rather deep tomentose hollow, subhepatic (branchial) ridge distinct. Abdominal segments 4–6 keeled, keel on 6th segment ending acutely. Telson medianly grooved, without lateral spines. 2nd and 3rd joints of 1st leg, and 2nd joint only of 2nd leg each with a spine; exopod of 5th leg absent (a tiny immobile papilla marking its position). 7th joint of mxp. 3 ♂ not quite as long as 6th joint (equal to distance from base of 6th joint as far as subterminal insertion of 7th joint). Thelycum of two flaps meeting (when fully developed) in middle line. Petasma, fig. 107, *e*.

Length up to 300 mm. (Alcock). Pale buff, more or less semi-transparent, minutely speckled with blue, especially on abdomen, greyish cross-bands more or less conspicuous on 1st, 3rd and 6th abdominal segments, that on 6th segment the most conspicuous, keel on carapace and abdominal segments grey-brown; antennal scale, eye-stalks, and especially the apical parts of uropods blue, fringe on latter *dull* reddish; flagella of antenna banded; pleopods dark reddish. In *caeruleus* the colour is a vivid blue, especially intense on eye-stalks, antennal scale, and uropods, and on the cross-bands on abdominal segments.

Localities.—Natal (Krauss); Zwartkops River mouth, Algoa Bay (Stebbing); Nahoon River, East London (Stebbing); Buffalo River,

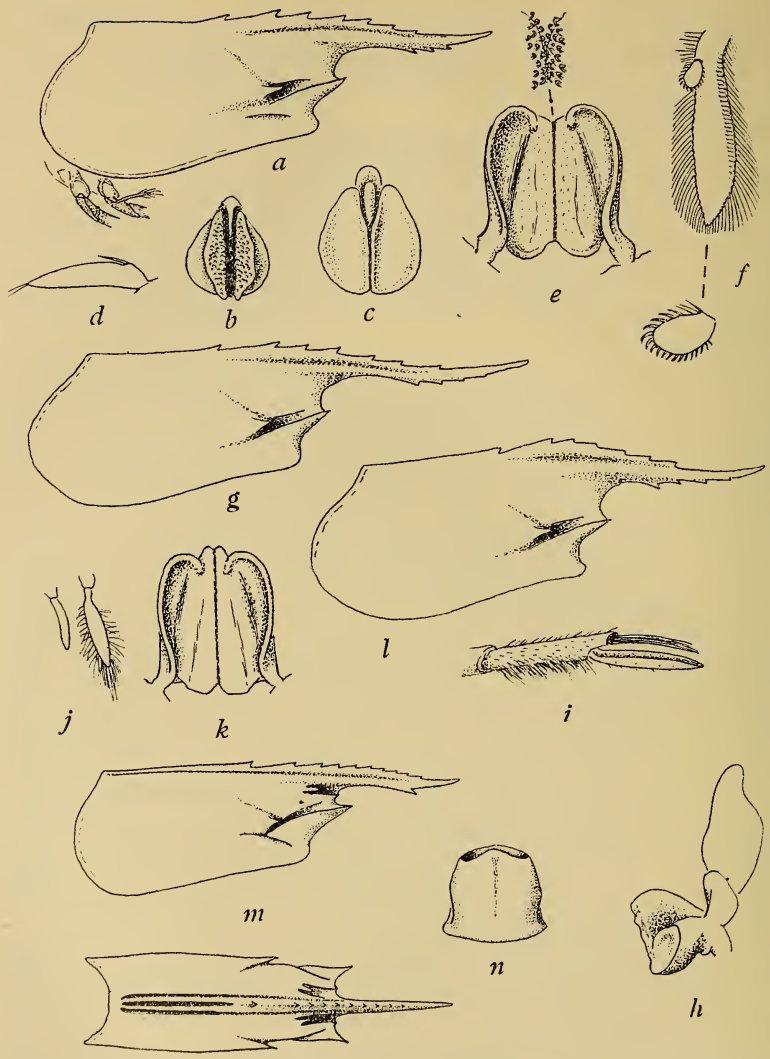


FIG. 107.—*Penaeus monodon* Fabr. *a*, carapace (setae on rostrum omitted) with bases of 4th and 5th legs. *b*, open thelycum, ♀ 145 mm. long. *c*, thelycum, ♀ 190 mm. long. *d*, pleopod 1 ♂, 30–55 mm. long (inner margin above). *e*, petasma (1st pleopods), ♂ 160 mm. long, opened out, posterior view, with coupling further enlarged. *f*, anterior view of endopod of left pleopod 2 ♂, with appendix masculina further enlarged.

Penaeus indicus M. Edw. *g*, carapace (setae on rostrum omitted). *h*, inner view of mandible, setae on palp omitted. *i*, 6th and 7th joints of mxp. 3 ♂. *j*, exopods of 4th (right) and 5th (left-hand figure) legs. *k*, petasma of ♂. *l*, carapace of ♀ approximating to *merguiensis* de Man.

Penaeus japonicus Bate. *m*, lateral and dorsal views of carapace. *n*, thelycum of ♀.

East London (S. Afr. Mus.), Port St. Johns (S. Afr. Mus.); Durban (Lenz); Durban and Umgeni Lagoon, and Delagoa Bay (S. Afr. Mus.); off Durban, 27–40 fathoms (Gilchrist); St. Lucia Bay, Zululand (coll. Fisheries Survey, 1940).

Distribution.—Indian Seas, East Indies, Japan.

Remarks.—Owing to the unholy confusion between "*monodon*" and "*semisulcatus*," de Man and Kemp recorded this species under Dana's name.

The records of Bianconi (Mozambique) and Hilgendorf (*l. c., supra*, Quelimane and Zanzibar) are probably, but not certainly, referable to this species.

The largest specimen I have seen (a ♀ from Delagoa Bay) measures 270 mm.

I have no hesitation in making *caeruleus* a synonym; I would not even regard it as a special colour variety. de Man regarded it as a variety of *semisulcatus* de Haan because, on examination of a specimen sent him by Stebbing, he found an exopod on the 5th leg. This statement is in conflict with Stebbing's description, and my own examination of 15 cotypes, 30–125 mm. in length. In a bottle containing 4 large cotypes of *caeruleus*, returned by Stebbing with his autograph label, there was also a specimen of *indicus* (speckled with blue). Is it not possible that Stebbing sent de Man a specimen of *indicus* by mistake, and that de Man accepted it as *caeruleus* "on trust"? *P. indicus has* an exopod on 5th leg, and as Stebbing says (1900, Mar. Invest. S. Afr., i, p. 36), "mistakes are never impossible."

Stebbing's largest *caeruleus* was approximately 135 mm. in length. He figured one side of the petasma of an immature ♂, described and figured an immature thelycum, and mentioned that in 2 larger ♀♀ the sides of the thelycum have closed over to meet in the middle line.

The 4 largest cotypes (95–125 mm.) are all immature ♂♂, because the two halves of the petasma are not united, although the whole inner margin is closely set with coupling-hooks (in Stebbing's pl. 21, fig. *pet.* represented as serrations). In a 160 mm. *monodon* they are united, not indissolubly, but very firmly, the very numerous multiseriate coupling-hooks resembling what might be described as a "multi-Zip" fastener (fig. 107, *e*). In specimens 30–55 mm. in length each half of the petasma, *i.e.* each pleopod 1, is a small lanceolate appendage with a spine-seta on its inner margin (opposed to its fellow) (fig. 107, *d*).

These juvenile specimens show the specific features of the adult; absence of exopod on 5th leg, presence of spines on the proximal joints

of 1st and 2nd legs (that on 2nd leg indicated only by a minute setiferous tubercle in the 30 mm. specimen), rostral formula and ridges on carapace.

Penaeus semisulcatus de Haan

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 250, pl. 34, fig. 1 (*monodon*, non Fabr.) (? figs. 1″, 1‴; these figs. show no 5th exopod).

1906. Alcock, *l. c.*, p. 8, pl. 1, figs. 1, 1, *a*, *b* (*monodon*, non Fabr.).

1911. de Man, *l. c.*, p. 97, and 1913, pl. 9, figs. 31, *a*, *b*.

1917. Stebbing, Ann. Durban Mus., i, p. 441, pl. 22 (petasma).

1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 12.

1930. Monod, Zool. Anz., xcii, p. 138, fig. 2.

[not *semisulcatus* Stebbing 1915. =*indicus*.]

Agrees with *monodon* except that it possesses a small but distinct exopod on 5th leg.

Length up to 230 mm. (Alcock).

Localities.—Durban Bay (probably) (Stebbing); off Durban, 38 fathoms (Calman); Durban Bay, St. Lucia Bay, and off Zululand coast, 26 fathoms (S. Afr. Mus.).

Distribution.—Suez, Red Sea, coasts of India, East Indies, Philippine Is., Japan. By migration through Suez Canal to Gulf of Alexandrette, Syria.

Remarks.—Although Stebbing (1917) did not mention the exopod of the 5th leg as being present or absent in his specimen, he quotes de Man and must have been aware of this diagnostic feature separating *semisulcatus* and *monodon*.

Hilgendorf's record has been assigned to *monodon* (see *supra*), but there is no means of being sure unless the specimens are still in existence.

I have only seen 1 ♂, 2 juv. ♂♂, and 2 juv. ♀♀. The species would seem to be much rarer than *monodon*.

Penaeus indicus M. Edw.

Fig. 107, *g–l*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 844.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 69 (*semisulcatus*, non de Haan).

1915. Kemp, Mem. Ind. Mus., v, p. 319.

1917 (May). Stebbing, Ann. S. Afr. Mus., xvii, p. 32.

? 1917 (July). Stebbing, Ann. Durban Mus., i, p. 442, pl. 22 (*durbani*).

1917. *Id.*, *ibid.*, p. 443 (*indicus* var. *longirostris* de Man).

1921. *Id.*, Ann. S. Afr. Mus., xviii, p. 463, pl. 20 (Crust., pl. 115) (*longicornis*).

1926. Schmitt, *l. c.*, p. 360 (in key) and p. 361.

1937. Menon, Bull. Madras Mus., III, 5, p. 2, figs. (development).

1938. Ramadan, John Murray Exp., v, p. 62.

1942. Chace, Bull. Mus. Comp. Zool. Harv., xci, p. 185.

Rostrum with distinct double curve, slender distally and extending beyond apex of antennal scale, usually longer in juv. than in adult; lateral grooves extending backwards to about the hindmost rostral tooth; post-rostral keel often feebly developed, moderately sharp or slightly flattened, with one or two shallow pits; 8–9 (occasionally 7) dorsal and 4–5 (occasionally 3 or 6 or 7) ventral teeth. Carapace glabrous; post-antennular spine and ridge, hepatic spine, with ridge above as in *monodon*, but subhepatic ridge absent. Abdominal segments 4–6 keeled, keel on segment 6 ending acutely. Telson grooved, without lateral spines. 2nd and 3rd joints of 1st leg, and 2nd joint only of 2nd leg with a spine. A small but movable, non-setose, exopod on 5th leg. 7th joint of mxp. 3 of adult ♂ sub-equal to 6th joint. Thelycum as in *monodon*. Petasma, fig. 107, *k*.

Length up to 200 mm. (Alcock). Pale buff more or less semi-transparent, speckled with blue; crest of carapace and abdomen, keel and margin of telson, median ridge and outer margin of uropods brown; eye-stalks and antennal scale faintly bluish, margin of uropods usually blue with the fringe *bright* red; flagella of antennae banded or spotted, 2nd antennae uniform; pleopods faintly reddish.

Localities.—Quelimane (Hilgendorf); Umgeni Lagoon and Durban (Stebbing); Delagoa Bay (Stebbing, and S. Afr. Mus.); off Tugela River, Natal, 24 fathoms, and mouth of Zwartkops River, Algoa Bay (S. Afr. Mus.); Buffalo River, East London (S. Afr. Mus.) Port St. Johns (S. Afr. Mus.); St. Lucia Bay, Zululand (Fisheries Survey, 1940).

Distribution.—East coast of Africa, Gulf of Aden, coasts of India and Ceylon, Andaman Is., East Indies.

Remarks.—Stebbing's 1921 locality (off Cape Point, 650 fathoms) is obviously due to a mixture of labels; the Museum registration number does not refer to a Decapod Crustacean, and the locality is incorrect; the specimen was not returned to the Museum and cannot be checked.

Two large ♀♀ (185 mm.) from off the Tugela River approximate to

merguiensis de Man in the shape of the rostrum, which is rather strongly arched, but not so strongly as in de Man's (1888) or Alcock's (1906) figures (fig. 107, *l*). One of this pair has no trace of any ventral teeth on rostrum (Stebbing's *durbani* had only one ventral tooth). The ♂♂ from Umgeni Lagoon are typical *indicus* as regards the proportional lengths of the 6th and 7th joints of mxp. 3.

Occasionally the exopod of 5th leg is absent from one side, or from both sides; in which case the identity must be confirmed by recourse to the characters of the rostrum and carapace.

Schmitt (1926) had not seen Stebbing's 1921 paper; but as Burkenroad (1934) does not follow Stebbing in identifying *indicus* M. Edw. 1837 with *longicornis* (Oliv.) 1825, Milne Edwards' name is here retained.

Penaeus canaliculatus Oliv.

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 243, pl. 32, figs. 1, 2.

1911. de Man, *l. c.*, p. 106, and 1913, pl. 9, figs. 34, *a*, *b*.

[not Alcock, 1906, nor Stebbing, 1914, p. 13. =*japonicus*.]

The typical form, from which Bate separated *japonicus* as a variety, is characterized by having no spines on the lateral margins of telson.

Length up to 137 mm. (de Man).

Locality.—Port Edward, Natal (coll. T. A. Stephenson).

Distribution.—Mauritius, Red Sea, East Indies, Fiji Is.

Remarks.—As stated below under *japonicus*, Stebbing's 1914 specimen (S. Afr. Mus., No. A1190, that is to say, the specimen *returned as such* by Stebbing and bearing his autograph label) is really *japonicus*.

The only specimens I have seen, in which there are no spines on the telson and no trace of any pits or notches for their insertion, are two juv. ♀♀, 45 and 70 mm. in length, from the above locality.

Penaeus japonicus Bate

Fig. 107, *m*, *n*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 843 (*canaliculatus* with telsonic spines).

1906. Alcock, *l. c.*, p. 14, pl. 2, figs. 6, 6, *a–c* (*canaliculatus*, non Oliv.).

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 12, and p. 13 (*canaliculatus*, non Oliv.).

? 1914. *Id.*, *ibid.*, p. 14, pl. 3 (Crust., pl. 117) (*pulchricaudatus*, =juv.).

1918. Stebbing, Ann. Durban Mus., ii, p. 60.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.

1926. Schmitt, *l. c.*, p. 359 (in key) and pp. 366, 369.

1930. Monod, Zool. Anz., xcii, p. 138, fig. 3.

Rostrum nearly straight, extending to or slightly beyond end of antennal scale, lateral grooves extending backwards almost to hind margin of carapace, flanking the post-rostral grooved keel; 9–11 dorsal teeth and a single ventral tooth. Carapace glabrous; post-ocular spine and ridge present, post-antennular spine and ridge, hepatic spine with ridge above, and a well-marked subhepatic ridge curving downwards anteriorly. Abdominal segments 4–6 keeled, keel on segment 6 ending acutely. Telson grooved, distal half of lateral margin with 3 mobile spines (sometimes indistinct or lost, but the notches for their insertion distinct). 2nd joints of 1st and 2nd legs each with a strong slender spine, but no spine on 3rd joint of 1st leg. Exopod of 5th leg setose and not much smaller than that of 4th leg. 7th joint of mxp. 3 ♂ about half the length of 6th joint. Thelycum pouch-like, opening anteriorly. Petasma similar in shape to that of *monodon*.

Length up to 270 mm. (Kishinouye). Light brown or greenish with darker cross-bands, especially on abdomen; telson and uropods banded with red, brown and yellow, with a blue band at end of both rami of uropods, the fringe carmine (Kishinouye, Stebbing).

Localities.—Mozambique (Hilgendorf); off Cape St. Francis, 32 fathoms, off Durban, 15 fathoms, and Durban Bay (Stebbing); Delagoa Bay (coll. K. H. B.); Knysna, Zwartkops River mouth, and St. Lucia Bay (S. Afr. Mus.).

Distribution.—East coast of Africa, Red Sea, Indian Seas, East Indies, Japan, Fiji Is. By migration through Suez Canal to Gulf of Alexandrette, Syria.

Remarks.—The specimen S. Afr. Mus., No. A1190 (returned as such by Stebbing), which was recorded by Stebbing as *canaliculatus* because of the supposed absence of telsonic spines, has in fact got 3 pairs of spines.

In ♀♀ 85–90 mm. in length the thelycum has the characteristic shape but not its full size; in one of 45 mm. there are 2 small cushion-like lobes not meeting in the middle line; in specimens of 70–80 mm. the lobes meet but are not yet fused to form a tubular structure.

Two large ♀♀, 168 and 175 mm. in length, from Knysna were collected by Dr. J. L. B. Smith, and constitute the most westerly record on the South African coast of any species of *Penaeus*.

This species seems to be much rarer in South African waters than either *monodon* or *indicus*.

Gen. Penaeopsis Bate (M. Edw. MS.)

1906. Alcock, *l. c.*, pp. 5, 7, 16 (*Metapenaeus* part).

1911. de Man, *l. c.*, pp. 8 (list of species) and 53 (*Penaeopsis* part + *Parapenaeus* part).

1926. Schmitt, Biol. Res. "Endeavour," v, p. 319 (part).

1934. Burkenroad, Bull. Bingham Ocean. Coll., iv, pp. 4, 7 (restricted).

1943. Gurney, Proc. Zool. Soc. Lond., cxiii, B, p. 12 (larval stages).

Carapace without longitudinal or transverse sutures; antero-inferior angle with a spine. Basal joint of ant. 1 with spine on inner margin. Exopods on all legs; 2nd joint of 3rd leg without spine. Telson with a pair of lateral spiniform teeth distal to a series of mobile spines. Petasma without channelled spout-like projections, symmetrical (*Penaeopsis*) or asymmetrical (*Metapenaeopsis*). Mxp. 3 in ♂ not modified, but inner flagellum of ant. 1 frequently sexually dimorphic.

Remarks.—Most of the species included in this genus as restricted by Burkenroad are Indo-Pacific.

Key to the South African Species.

Petasma asymmetrical (*Metapenaeopsis*) in all three species.

1. Rostrum extending beyond eyes to end of antennal scale, with 6–7 dorsal teeth (excl. epigastric tooth) . . *philippii.*
2. Rostrum extending a little beyond eyes, but not to end of antennal scale.
   - *a.* 6th abdominal segment twice as long as 5th, and longer than telson . . . . . *quinquedentata.*
   - *b.* 6th abdominal segment 1½ times the 5th, and shorter than telson . . . . . *hilarulus.*

Penaeopsis philippii (Bate)

Fig. 108, *a*, *b*.

1881. Bate, Ann. Mag. Nat. Hist. (5), viii, p. 181 (*Penaeus p.*).

1888. *Id.*, Rep. H.M.S. *Challenger*, xxiv, p. 261, pl. 35, figs. 2, 3 (*philippinensis*).

1906. Alcock, *l. c.*, p. 27, pl. 4, fig. 13 (thelycum) (*M. coniger* var. *andamanensis*).

1919. Parisi, Atti Soc. Ital. Sci. Nat., lviii, p. 64, pl. 5, fig. 7 (*coniger* var. *andamanensis*).

1923. Calman, Ann. Mag. Nat. Hist. (9), xii, p. 536, figs. 1, 2 (thelycum, antennular spine).

1925. *Id.*, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 12.

1938. Ramadan, John Murray Exp., v, p. 70.

Body tomentose. Carapace without stridulating ridges.* Rostrum rather slender and curved, extending beyond eyes to end of antennal scale, with 6–7 teeth dorsally in addition to the smaller epigastric tooth. Inner flagellum of ant. 1 longer than outer, in ♂ concave on upper margin near base, followed by a swelling bearing a stout spine. Left side of petasma longer than right side. Thelycum with median plate broad, longitudinally grooved, its free hind margin more or less bilobed. Telson shorter than 6th segment, which is twice length of 5th segment.

Length up to 133 mm. (Alcock).

Locality.—Off Durban, 191 fathoms (Calman).

Distribution.—Zanzibar, Andaman Is., East Indies, Philippine Is., Japan.

Penaeopsis quinquedentata (de Man)

Fig. 108, *c–f.*

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 15 (references).

Body tomentose. Carapace without stridulating ridges. Rostrum rather strong, short, extending very little beyond eyes and not reaching end of antennal scale, with 5–6 teeth dorsally in addition to the small epigastric tooth, ventrally fringed with long plumose setae. Flagella of ant. 1 subequal, inner flagellum without spine in ♂. Petasma with left lobe longer than right. Telson with 3 pairs of movable spines anterior to the trifid apex, shorter than 6th abdominal segment which is twice as long as 5th, and $1\frac{1}{2}$ times the 3rd segment; 3rd–6th segments keeled.

Length up to 45 mm. (de Man).

Locality.—Off Cape Natal (Durban), 54–62 fathoms (Stebbing, and S. Afr. Mus.).

* Stridulating ridges occur on the postero-lateral margin of the carapace where they are played over by the pleurae of 1st abdominal segment, in *P. novae-guineae* (Hasw.) (syn. *stridulans* Alcock 1906).

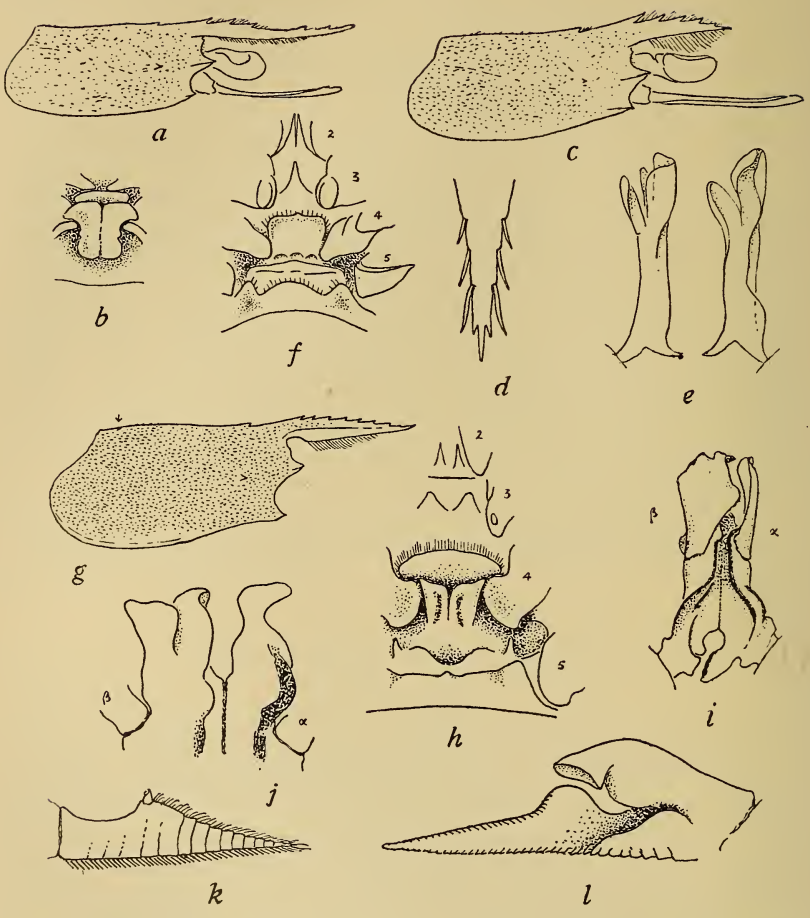


FIG. 108.—*Penaeopsis philippii* (Bate). *a*, carapace, with eye and antennal scale. *b*, thelycum ♀. (Both figures after Bate, 1888.)

Penaeopsis quinquedentata (de Man). *c*, carapace, with eye and antennal scale. *d*, apex of telson, setae omitted. *e*, two views of petasma of juv. ♂. *f*, sternum and thelycum ♀, after de Man's fig. 23, *d*.

Penaeopsis hilarulus de Man. *g*, carapace, arrow indicating bare medio-dorsal dot. *h*, sternum and thelycum ♀. *i*, posterior view of petasma ♂, thick lines indicating strongly chitinised ribs. *j*, the same, apex further enlarged, only the bases of the displaced lateral flaps (*α* and *β*) shown. *k*, inner flagellum of ant. 1 ♂, bases only of the long setae on lower margin shown. *l*, pleopod 2 ♂, setae omitted.

Distribution.—East Indies.

Remarks.—There are 17 other specimens in the South African Museum, all juvenile and none of them exceeding Stebbing's 38 mm. specimen in length. The two halves of the petasma are not joined, and the thelycum resembles Calman's fig. 2 of that of *philippii* (1923) more than it does de Man's fig. 23, *d* (1913). The appendix masculina on pleopod 2 ♂ is scale-like.

Penaeopsis hilarulus de Man

Fig. 108, *g–l.*

? 1902. Rathbun, Proc. U.S. Nat. Mus., xxvi, p. 39, figs. 6–8 (*Parapenaeus mogiensis*).

? 1906. Alcock, *l. c.*, p. 29, pl. 5, figs. 15, 15, *a*, *b* (*Metapenaeus mogiensis*).

1911. de Man, *l. c.*, p. 70 (*P.* sp.) and p. 71 (*hilarulus*).

1913. *Id.*, *ibid.*, pl. 7, fig. 22, *a–d* (*P.* sp.).

? 1926. Schmitt, *l. c.*, p. 347, pl. 61, fig. 3 (thelycum of *mogiensis* from Torres Straits).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Body thickly tomentose. Carapace without stridulating ridges. Rostrum moderately long, extending to end of 2nd joint of peduncle of ant. 1; with 9 teeth, the epigastric tooth small, and the subapical one minute; no post-rostral keel; in ♀ a small round dot without tomentum in middle line near hind margin. Flagella of ant. 1 subequal, short, equal to 2nd peduncular joint, inner flagellum in ♂ laterally compressed, upper margin concave near base, followed by a swelling bearing a stout spine. Mxp. 3 extending to end (almost), 3rd leg to middle, and 5th leg to basal third of antennal scale. Petasma asymmetrical, left hinged lobe narrower than right, apical lobes (see fig. 108, *j*). Thelycum (fig. 108, *h*): a hollowed plate with arched setiferous anterior margin between bases of 4th legs, in its centre 2 juxtaposed projecting plates overlapping (as seen in figure, underriding in normal position of animal) the oval plate-like expansions of the 4th coxae; 2 transverse plates between bases of 5th legs, the anterior one with sharp tooth laterally. In ♀ (not in ♂) 2 triangular teeth between bases of 3rd legs, and 2 spines between bases of 2nd legs. Appendix masculina of pleopod 2 ♂ with apical, shallowly-trumpet-like expansion; endopod short with semicircular expansion on inner basal margin. 5th abdominal segment about $\frac{3}{5}$ length of 6th, which is a little shorter than telson, and only very little longer than 3rd segment;

3rd–6th segments keeled (hind part of 2nd segment scarcely keeled, but with a bare median stripe).

Length up to 56 mm. ♂♀.

Locality.—Durban Bay (coll. K. H. B. 1912, 1 ♂, 2 ♀♀).

Distribution.—East Indies.

Remarks.—As regards the thelycum these specimens agree with de Man's figures of *hilarulus*, and, less closely, with Schmitt's figure of a Torres Straits specimen. de Man shows the expanded 4th coxal plates as rectangular, whereas here they are rounded; and when the legs are closely drawn in, these plates lie between the hollowed "sternal" plate and the two projecting plates.

Schmitt regards *hilarulus* as a synonym of *mogiensis* (Rathbun). The thelycum of Alcock's specimens certainly seems much more like that of *mogiensis* as figured by Rathbun and Schmitt, than that of de Man's specimens. The lack of information, however, on other features, such as the details of the petasma, appendix masculina on pleopod 2, inner flagellum of ant. 1 ♂, prevent a proper comparison and verdict of the identity of the various specimens. The Durban specimens are provisionally identified with de Man's East Indies species.

Gen. Metapenaeus W-Mason & Alck.

1891. Wood-Mason and Alcock, Ann. Mag. Nat. Hist. (6), viii, p. 271 (part).

1906. Alcock, *l. c.*, p. 16 (part).

1911. de Man, *l. c.*, p. 53 (*Penaeopsis* part).

1926. Schmitt, Biol. Res. "Endeavour," v, p. 319 (*Penaeopsis* part).

1934. Burkenroad, Bull. Bingham Ocean. Coll., iv, pp. 7, 29 (restricted).

Carapace without longitudinal and transverse sutures; antero-inferior angle without spine. Basal joint of ant. 1 without spine on inner margin. No exopod on 5th leg; 2nd joint of 3rd leg with a spine; epipods absent from mxp. 3 and last 2 pairs of legs. Telson with lateral movable spines or spinules (minute and inconspicuous in *monoceros* and *affinis*, but easily visible in *stebbingi*, and with some of the posterior ones enlarged and conspicuous in *ensis*), but no subapical fixed spiniform teeth. Petasma symmetrical, forming (when fully developed) an almost completely closed tube, with apical spout-like projections. Mxp. 3 not modified, but 4th joint

of 5th leg, or of 4th and 5th legs, modified in adult ♂. Appendix masculina on pleopod 2 ♂ pedunculate, apically knob-like, strongly chitinized, fitting into the concave base of endopod (in *monoceros* and *stebbingi*, other species not seen by me).

Remarks.—Indo-Pacific, but some of the species appear to have migrated in recent times through the Suez Canal into the Mediterranean.

Key to the South African Species.

1. 5th leg not reaching to end of antennal scale.
   a. Petasma with apical convoluted flaps. Thelycum, fig. 109, *c* . . . . . *monoceros*.
   b. Petasma with laterally curving projections, and apical stylets. Thelycum, fig. 109, *h* . . . . *stebbingi*.
2. 5th leg extending beyond (usually) end of antennal scale . *affinis*.

Metapenaeus monoceros (Fabr.)

Fig. 109, *a–e*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 844.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 17, pl. 4 (Crust., pl. 68) (*Penaeopsis spinulicauda*).

1915. *Id.*, *ibid.*, p. 70 (references).

1915. Kemp, Mem. Ind. Mus., v, p. 321 (*Penaeopsis m.*).

1915. Pesta, Arch. f. Naturg., Abt. A, 1, p. 104 (quoted from Schmitt).

1917. Stebbing, Ann. Durban Mus., i, p. 444 (*P. spinulicauda*).

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 12 (*Penaeopsis m.*).

1926. Schmitt, *l. c.*, p. 325, pl. 58, figs. 1, 2.

1927. Balss, Trans. Zool. Soc. Lond., xxii, pp. 221, 225.

1930. Monod, Zool. Anz., xcii, p. 140, fig. 4 (*Penaeopsis m.*).

1934. Burkenroad, *l. c.*, p. 32.

Body very finely tomentose, but frequently the greater part of the abdomen and the branchial region of the carapace are rubbed more or less naked. Rostrum nearly straight, slightly up-tilted, extending to about end of peduncle of ant. 1, with 9–12 teeth (incl. epigastric tooth); post-rostral keel continued nearly to hind margin of carapace. 2nd joint of 1st–3rd legs with a strong, simple spine; inner apex of 3rd joint of 1st leg with a short spine. 5th leg extending to about middle (rarely to near end) of antennal scale; its 3rd joint in adult ♂ with

short keels or flanges on dorsal and ventral margins distally, 4th joint with a notch near base on dorsal margin and a spine curving outwards and downwards, the upper margin beyond the spine crenulate or serrulate (fig. 109, *b*). Telson medio-dorsally grooved, with numerous minute (mobile) spinules on lateral margins. Petasma with the

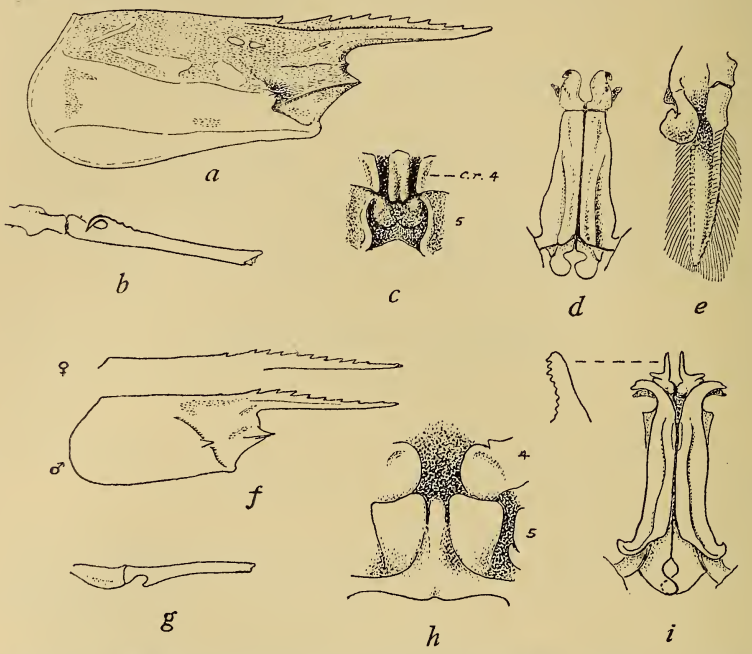


Fig. 109.—*Metapenaeus monoceros* (Fabr.). *a*, carapace, setae on rostrum mitted. *b*, 4th joint and end of 3rd joint of 5th leg ♂. *c*, thelycum ♀, *c.r.* 4, oxal ridge of 4th legs. *d*, hind view of petasma ♂, closed. *e*, anterior view of endopod and appendix masculina of left pleopod 2 ♂.
Metapenaeus stebbingi Nob. *f*, carapace ♂ and ♀. *g*, 4th joint and end of 3rd joint of 5th leg ♂. *h*, thelycum ♀, with 4th and 5th coxae. *i*, hind view of petasma ♂, closed, with apex of median lobe further enlarged.

posterior (ventral) flap of the apical projection convoluted. Thelycum enclosed laterally by prominent vertical ridges which may be ear-like and in-curved, anteriorly a median grooved ridge flanked by the ridge-like lobes of the 4th coxae. Appendix masculina on pleopod 2 ♂ (fig. 109, *e*). Outer margin of outer ramus of uropod proximally concave in ♂.

Length ♀ up to 180 mm., ♂ smaller. Pale, more or less semi-transparent with bluish speckling, chiefly in the form of cross-bands

on abdominal segments, flagellum of antenna 2 reddish, pleopods bluish (K. H. B.).

Localities.—Quelimane (Hilgendorf); Delagoa Bay (Pesta, Stebbing); Durban Bay, and off Tugela River, 12–14 fathoms (Stebbing); off Umvoti River, Natal, 38 fathoms (Calman); Delagoa Bay, Zululand coast, Durban Bay, Umgeni Lagoon, Umkomaas, Port St. Johns, and Cape Henderson (N. of East London) (S. Afr. Mus.).

Distribution.—Mauritius, Indian Seas, East Indies, Philippine Is., Japan, Queensland. Mediterranean, by migration through Suez Canal.

Remarks.—As Burkenroad suggests (*l. c.*, p. 30), *spinulicauda* can only be regarded as founded on an immature specimen of this species. Other specimens, up to 75 mm. in length, identified by Stebbing as *spinulicauda*, show all the characters (as far as they are developed, *e.g.* relatively short 5th leg) of *monoceros*.

Metapenaeus stebbingi Nob.

Fig. 109, *f–i*.

1904. Nobili, Bull. Mus. d'Hist. Nat. Paris, x, p. 229.

1906. *Id.*, Ann. Sci. Nat. zool., ser. 9, iv, p. 15, pl. 1, fig. 2.

1921. Tattersall, J. Linn. Soc. Lond., xxxiv, p. 365, pl. 27, figs. 7–10, pl. 28, fig. 13.

1927. Gurney, Trans. Zool. Soc. Lond., p. 233 (development *Penaeopsis s.* ?).

1930. Monod, Zool. Anz., xcii, p. 140, fig. 5 (*Penaeopsis s.*).

1934. Burkenroad, *l. c.*, p. 33.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Carapace glabrous except for a short strip of fine tomentum on either side of epigastric tooth, a patch above the post-antennal spine, and in the post-orbital groove; cervical groove well marked both above and below hepatic spine, its hind margin setulose; rostrum extending almost to end of peduncle of ant. 1, with 9 (♂), 11 (♀) teeth (incl. the epigastric tooth), the subapical one minute, the epigastric almost obsolete in the present ♂, post-rostral keel none or very feeble. Mxp. 3 extending to end of peduncle of ant. 2. A strong simple spine on 2nd joint of 1st–3rd legs, that on 3rd leg not enlarged or different from the others. 5th leg extending to end of first third of antennal scale (middle of eye); ventral margin of 3rd joint in ♂ keeled, 4th joint with a notch and triangular tooth on ventral margin near base. Telson medio-dorsally grooved, with about a dozen (in the present ♂)

(Nobili: 6–8) small but easily visible lateral mobile spines. Petasma with 2 laterally curved spout-like processes on each side, and an apical styliform process, which is serrate on its hind (ventral) margin; basal lobes overlapping. Thelycum, fig. 109, *h*; the 4th coxa has a strong ridge projecting medianly but not meeting its fellow; 3rd coxa with a small and inconspicuous ridge.

Length up to 90 mm. (Nobili). Greyish, faintly speckled, pleopods pinkish (K. H. B.).

Locality.—Delagoa Bay (coll. K. H. B. 1912, 1 ♂, 1 ♀).

Distribution.—Suez, Red Sea. By migration through Suez Canal to Port Said.

Remarks.—Burkenroad has pointed out that the numerals 9 and 12 on Tattersall's plate 27 have been transposed, the right-hand figure being referable to *stebbingi*, the left-hand one to *vaillanti*.

I have seen only the pair collected by myself, which agree with Tattersall's figures. They both measure 70 mm. I have not seen Nobili's 1906 paper.

Metapenaeus affinis (M. Edw.)

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 16.

1934. Burkenroad, *l. c.*, p. 29.

Not decisively separable from *monoceros*, but the rostrum usually somewhat sigmoid and cristate, with fewer teeth (less than 9), carapace and hinder abdominal segments less strongly carinate; 5th leg extending at least to, usually beyond, apex of antennal scale, its joint with a notch and triangular tooth; thelycum more open, the lateral ridges splayed outwards and unequally bilobed.

Stebbing himself regarded the identification of a specimen of unknown origin as uncertain. The specimen is a very young ♀, and the 5th legs reach almost to end of antennal scale.

Distribution.—Indian Seas, East Indies, Japan.

Gen. Parapenaeus S. I. Smith

1906. Alcock, *l. c.*, pp. 7, 30, 52.

1911. de Man, *l. c.*, pp. 9, 77.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 18.

1926. Schmitt, Biol. Res. "Endeavour," v, p. 323.

1934. Burkenroad, Bull. Amer. Mus. Nat. Hist., lxviii, p. 107 (redefined).

1938. Heldt, Ann. Inst. ocean. Paris, xviii, pp. 40 *sqq.* (reproduction. development).

1938. Ramadan, John Murray Exp., v, p. 73.

1939. Burkenroad, Bull. Bingham Ocean. Coll., vi, p. 53.

Carapace with longitudinal and transverse sutures; antero-inferior angle with a branchiostegal (pterygostomial) spine (tooth), except in *longipes* Alck. Basal joint of ant. 1 with spine (often very small) on inner margin. Exopods absent from all legs (or minute rudiments present). Epipods absent from mxp. 3 and last 2 or 3 legs. A spine on 2nd and 3rd joints of 1st leg only. Telson with a pair of subapical fixed spiniform teeth (*i.e.* apex trifid), preceded by a pair of minute mobile spines. Petasma symmetrical. Thelycum with a pair of invaginated receptacles but without median pocket. Appendix masculina on pleopod 2 ♂ (in *fissurus*) knob-like as in *Metapenaeus*. Neither mxp. 3 nor 5th leg sexually dimorphic.

Remarks.—As redefined by Burkenroad contains only 6 Atlantic and Indo-Pacific species.

Key to the South African Species.

1. Branchiostegal spine small, forming the antero-inferior angle of carapace. 5th abdominal segment ⅔ length of 6th . *fissurus.*
2. Branchiostegal spine large, submarginal. 6th abdominal segment more than twice as long as 5th . . . *investigatoris.*

Parapenaeus fissurus (Bate)

Fig. 110, *c–e*.

1914. Stebbing, *l. c.*, p. 19, pl. 5 (Crust., pl. 69).

1938. Ramadan, *l. c.*, p. 73.

Carapace glabrous. Rostrum with double curve, extending nearly to end of peduncle of ant. 1 in ♀, but shorter in ♂, with 7 (sometimes 6 or 8) teeth, the subapical one minute and some little distance from tip, post-rostral keel moderately distinct; a distinct post-orbital denticle; branchiostegal spine small, forming the antero-inferior angle of carapace. 5th leg extending to middle of antennal scale. 5th abdominal segment about ⅔ length of 6th, which is subequal to telson. Petasma with hind (ventral) margins not fully in contact, apex with a bulbous flap, external to which is a more strongly chitinized trilobed process, anterior (dorsal) surface with a short chitinized ridge on either side of the conjoined margins, and some chitinized ribs (more or less projecting) supporting the apical flaps. Thelycum with 2 lobes or

bosses between the 5th coxae, a semicircular plate between 4th coxae, the intervening cavity with one or two obscure tubercles, and bounded laterally by a larger tubercle or knob on either side.

Length up to 135 mm. Salmon-red, cornea of eyes dark maroon.

Localities.—Off Tugela River, Natal, 36–46 fathoms (Stebbing, and S. Afr. Mus.); Port St. Johns (S. Afr. Mus.).

Distribution.—Zanzibar, Indian Seas, East Indies, Philippine Is.

Remarks.—The Port St. Johns specimens were washed ashore during an up-welling of cold water in September 1943 and March 1944. Similar occurrences were noted by the late Commander Z. Marsh in July 1936, October 1939, and February 1941.

Parapenaeus investigatoris Alck. & And.

Fig. 110, *a*, *b*.

1899. Alcock and Anderson, Ann. Mag. Nat. Hist. (7), iii, p. 279.

1899. Illustr. Zool. R.I.M.S. "Investigator," Crust., pl. 41, figs. 1, 1, *a*, *b*.

1901. Alcock, Ind. Deep-sea Crust., p. 18.

1906. *Id.*, *l. c.*, p. 32, pl. 6, figs. 17, 17, *a–c*.

1911. de Man, *l. c.*, p. 80.

1938. Ramadan, *l. c.*, p. 73, fig. 15, *d*, *e* (carapace, rostrum).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Rostrum short, extending only a little way beyond eyes, straight, directed slightly upwards, with 6–7 teeth; post-rostral keel faint or obsolete; a minute post-orbital denticle; branchiostegal spine large, submarginal, the antero-inferior corner narrowly rounded. 5th leg reaching slightly beyond middle of antennal scale. 6th abdominal segment more than twice length of 5th, and longer than telson. Petasma (according to Alcock) similar to that of *fissurus* but apically "not so intricate." Thelycum with semicircular plate between 4th coxae, a median concavity with lateral bosses or knobs, and a subcircular plate between 5th coxae bearing a median setiferous tubercle.

Length ♀ up to 75 mm. Cornea of eyes (as preserved) reddish.

Locality.—Off Cape Natal (Durban), 185 fathoms (S. Afr. Mus.).

Distribution.—Gulf of Aden, Indian Seas, East Indies.

Remarks.—Only a single ♀ collected by the s.s. *Pieter Faure* is in the South African Museum Collection.

Ramadan's fig. 15, *e* (as also his fig. 15, *a*, of *murrayi*), shows the longitudinal suture coinciding anteriorly with the post-antennal ridge

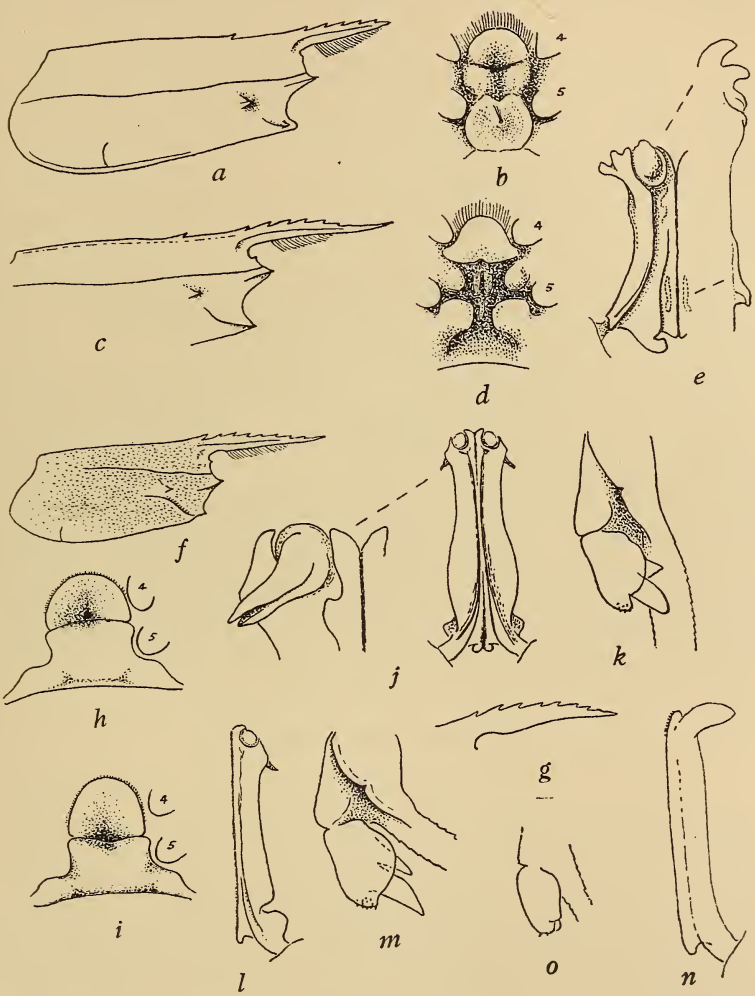


Fig. 110.—*Parapenaeus investigatoris* Alck. & And. *a*, carapace. *b*, thelycum ♀. *Parapenaeus fissurus* (Bate). *c*, carapace. *d*, thelycum ♀. *e*, posterior view of right side of petasma ♂, with profile of anterior surface showing chitinised ridge and supporting ribs.

Parapenaeopsis acclivirostris Alck. *f*, carapace. *g*, rostrum of 24 mm. ♂. *h*, *i*, thelycum ♀, showing variation. *j*, posterior view of petasma ♂, with anterior view of apex further enlarged. *k*, appendix masculina on pleopod 2 ♂. *l*, left pleopod 1 of 29 mm. ♂. *m*, appendix masculina of 29 mm. ♂. *n*, left pleopod 1 of 24 mm. ♂. *o*, appendix masculina of 24 mm. ♂.

and spine, instead of reaching the post-orbital margin *above* the post-antennal spine.

Gen. Parapenaeopsis Alck. (W-Mason MS.)

1901. Alcock, Cat. Ind. Deep-sea Crust., p. 14.

1906. *Id.*, *l. c.*, pp. 7, 34, 52.

1911. de Man, *l. c.*, pp. 9, 92.

1934. (Dec.). Burkenroad, Bull. Amer. Mus. Nat. Hist., lxviii, p. 95.

1934. (Sept.). *Id.*, Bull. Bingham Ocean. Coll., iv, p. 58 (although published earlier this paper is a sequel to the December paper).

1936. Kubo, J. Imp. Fish. Inst. Tokyo, xxxi, p. 55.

Carapace with longitudinal and transverse sutures, but the longitudinal suture not reaching hind margin of carapace; antero-inferior angle of carapace subacute or dentiform. Basal joint of ant. 1 without spine on inner margin (*acclivirostris*). Exopods present on all legs; epipods absent from mxp. 3 and at least the last 3 legs, sometimes from all legs. Telson without subapical fixed spiniform teeth (*i.e.* not trifid) and without movable spinules. Petasma symmetrical. Appendix masculina on pleopod 2 ♂ knob-like as in *Metapenaeus*, the endopod sometimes (*hungerfordi* Alck.) greatly reduced. Neither mxp. 3 nor 5th leg sexually dimorphic.

Parapenaeopsis acclivirostris Alck.

Fig. 110, *f–o*.

1905. Alcock, Ann. Mag. Nat. Hist. (7), xvi, p. 530.

1906. *Id.*, *l. c.*, p. 42, pl. 8, figs. 27, 27, *a*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Carapace minutely punctate and hispid. Rostrum extending to end of 2nd (♂) or 3rd (♀) peduncular joint of ant. 1, with 8 (or 7 or 9) teeth, the foremost one minute; no epigastric tooth and no post-rostral keel; antero-inferior angle with very small point; longitudinal suture extending about $\frac{2}{3}$ to hind margin of carapace. 5th leg reaching a little beyond middle of antennal scale. Epipods absent from all legs; 2nd joint of 1st and 2nd legs with a spine. 6th, 5th and hind half of 4th abdominal segments keeled; telson subequal to 6th (or a trifle longer), medianly grooved, without lateral spinules. Petasma with apical spout-like processes on anterior (dorsal) surface which curve proximally and laterally and are apparently erectile. Thelycum

with a semicircular concave plate between 4th coxae, and a broad trapezoidal plate between and behind 5th coxae. Appendix masculina on pleopod 2 ♂ trilobed.

Length ♀ up to 73 mm., ♂ 47 mm. Eyes deeply pigmented.

Localities.—Zululand coast as far south as Tugela River, 13–26 fathoms (S. Afr. Mus.); Delagoa Bay (coll. K. H. B. 1912, 1 ♂, 1 ♀).

Distribution.—Indian Seas, Persian Gulf.

Remarks.—These specimens are undoubtedly the same as Alcock's species, and equally certainly they are not Bate's *tenellus* as figured by Kishinouye. The latter author's figure of the petasma of the Japanese species shows much longer apical horn-like processes, and his figure of the thelycum shows a lozenge (diamond)-shaped plate between the 4th coxae. Both de Man and Burkenroad quote both species without suggesting their being synonymous. The former regards *crucifera* Ortm. 1890 as a synonym of *tenellus*.

The s.s. *Pieter Faure* obtained a large quantity of specimens off the Zululand coast. The largest ♀ exceeds the 60 mm. given by Alcock: the ♂♂ are all considerably smaller, not exceeding 47 mm. In a ♂ 29 mm. long the two halves of the petasma are not completely coupled; at 24 mm. the shape is rather strikingly different from that of the fully developed petasma (fig. 110, *n*). Slight variation occurs in the thelycum (fig. 110, *h*, *i*); the anterior margin of the plate between the 5th coxae may be slightly but distinctly concave.

Gen. Macropetasma Stebb.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 22.
1926. Schmitt, Biol. Res. "Endeavour," v, p. 325 (note).
1934 (Dec.). Burkenroad, *l. c.*, pp. 73, 74, 117–120.
1934 (Sept.). *Id.*, *l. c.*, pp. 9, 10.

Carapace without longitudinal and transverse sutures. Basal joint of ant. 1 without spine on inner margin, appendage on inner margin rather small, not twisted (fig. 111, *c*). Exopods on mxp. 1 and 1st leg; epipods absent from mxp. 3 and last 2 legs. Gills 15: 4 pleurobranchs, one each on mxp. 3 and 1st–3rd legs; 10 arthrobranchs, one each on mxp. 2 and 4th leg, 2 each on mxp. 3 and 1st–3rd legs; 1 podobranch on mxp. 2. No spines on 2nd or 3rd joints of legs; in ♂ a coxal spine on 1st leg, and denticles on 2nd joint of 3rd leg. Telson with 4 pairs of mobile spines, according to Burkenroad, but the hindmost pair appears to be fixed. Petasma attached near bases of peduncles of 1st pleopods, symmetrical, with very long apical stiletto-like filaments.

Thelycum: lateral parts of 5th sternite folded over to form paired ovoid receptacles, with a cowl-like median plate between 4th coxae. Male genital openings subcoxal. Peduncle of pleopod 1 ♀ unusually broad, exopod unusually long, no trace of endopod. Appendix masculina on pleopod 2 ♂ bell-shaped, endopod reduced. Inner flagellum of ant. 1, 1st joint of 1st leg, and 2nd joint of 3rd leg sexually dimorphic.

Remarks.—Endemic genus with one species. Balss stated that there were 2 arthrobranchs on mxp. 2; Burkenroad corrected this to one arthrobranch and one podobranch, which is herewith confirmed. Burkenroad on p. 119 said there were no exopods except on 1st leg, although he correctly stated on p. 74 that there was one also on mxp. 1.

Macropetasma africanum (Balss)

Fig. 111.

1913. Balss, Schultze Reise Südafr., v, p. 105, figs. 1–6 (*Parapenaeus a.*).

1914. Stebbing, *l. c.*, p. 22, pl. 8 (Crust., pl. 72).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 382.

Carapace glabrous. Rostrum short, extending to end of eye or a little beyond, arched and cultrate, with 9–10 teeth incl. the epigastric tooth, foremost tooth often minute, lower margin straight, fringed with plumose setae; in some specimens the smooth apical point is conspicuous (fig. 111, *b*); no post-rostral keel, no post-ocular tooth, antero-inferior angle narrowly rounded, hepatic spine small, cervical groove short. Flagella of ant. 1 longer than peduncle, nearly as long as carapace; inner flagellum in ♂ with tooth-like keel on inner margin near base, then abruptly narrowing. Mxp. 3 extending to base of flagellum of ant. 2. 3rd leg longest, reaching beyond end of peduncle of ant. 1; 5th leg longer than 4th. In ♂ a coxal spine on 1st leg, situate on the anterior surface (weakly chitinized and easily overlooked); in ♂ also the inner margin of 2nd joint of 3rd leg keeled, with 2–4 little denticles. 6th abdominal segment twice as long as 5th, without any trace of a lateral keel; only the 6th segment dorsally keeled, and sometimes feebly the hinder half of 5th, both ending in a small denticle. Telson shorter than 6th segment, shorter than inner ramus of uropod, not keeled dorsally, ending in a fine spiniform apex, with 3–4 pairs of lateral mobile spines, the anterior pairs small and inconspicuous, the distal pair usually fixed. Petasma with stiletto-like processes more than twice as long as main portion; the latter

when viewed from anterior (dorsal) side shows a longitudinal rib with buttress-like support at base, and externally a keel or lamina whose free distal end overlaps base of the stiletto-like process. Pleopod 2 ♂ with bell-shaped appendix masculina, the wide distal end of the bell only shallowly concave; endopod reduced, short, with semicircular expansion at base, the usual numerous long plumose setae

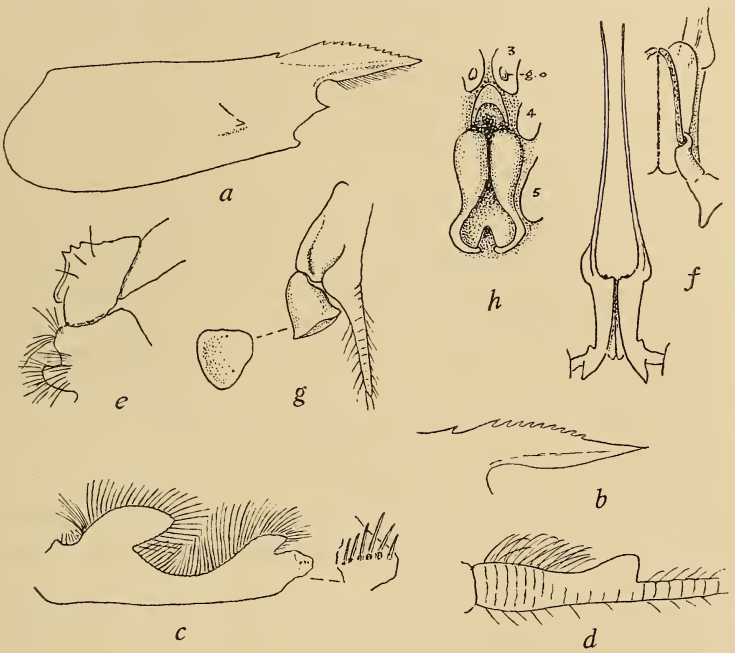


Fig. 111.—*Macropetasma africanum* (Balss). *a*, carapace. *b*, rostrum with prominent apex. *c*, inner view of basal joint of ant. 1, with apical lobe further enlarged (the marginal setae are plumose). *d*, base of inner flagellum of ant. 1 ♂. *e*, 1st and 2nd joints of 3rd leg ♂. *f*, petasma ♂, hind view, and anterior (dorsal) surface of basal part further enlarged. *g*, pleopod 2 ♂, with full view of end of bell-shaped appendix masculina. *h*, thelycum ♀.

reduced to a few short setae. Thelycum, fig. 111, *h*; 3rd leg with rather long coxal lobes bearing the genital openings. Pleopod 1 ♀ unusually broad at base, narrowing rapidly, exopod unusually long, extending to antero-inferior angle of carapace, no trace of endopod.

Length up to 94 mm. (Balss). White, pale cream, or pinkish, semitransparent, with more (dark var.) or less (light var.) numerous brown stellate or dendritic dots and specks, hinder part of 3rd abdominal segment, and margins and apices of telson and uropods with darker brown dots; mxp. 3 and 1st–3rd legs and peduncles of 2nd and 3rd

pleopods speckled with brown; 4th and 5th legs pale, unspotted; eyes dark brown (K. H. B. from specimens freshly preserved in formalin).

Localities.—Swakopmund (Balss); Mossel Bay, 15 fathoms (Stebbing); False Bay and mouth of Muizenberg Vlei, Knysna, Keurbooms River mouth (Plettenberg Bay), and Durban Bay (S. Afr. Mus.).

Remarks.—Stebbing recorded a ♀ 67 mm. in length; I have seen ♂♂ and ♀♀ up to 45 mm. At 33 mm. both ♂ and ♀ are apparently mature, the ♂ with the two halves of the petasma joined, and with the modification of the flagellum of antenna 1; a ♂ of 25 mm., however, has the halves of the petasma separate and no modification on the flagellum.

Stebbing's description and figure of the "inner ramus" of pleopod 2 ♂ is not quite correct.

Four specimens found washed up on the beach at the mouth of Keurbooms River (K. H. B., Jan. 1931) were quite pale in colour, with traces of red or pink on the end of 6th abdominal segment and ends of telson and uropods, but without the brown speckling usually so conspicuous in Natal specimens.

Luminous Spots.—These Keurboom River specimens also had luminous spots on the abdominal segments: a medio-dorsal one on each of 1st–6th segments, near the anterior margin on 1st–5th, but in the middle on 6th segment; and a lateral one near the hind margin on each of 1st–5th segments; a spot on base of telson, and a larger oval spot on both inner and outer rami of uropods. I have seen luminous spots also in examples from False Bay which had not been long in preservative.

With the exception of *Hymenopenaeus debilis* and *Plesiopenaeus coruscans*, photophores are unknown in the *Penaeidae*: see Burkenroad, 1936, Bull. Bingham Ocean. Coll., v, p. 102, 1938, and also p. 112, where he says these organs fade in alcohol; also Ramadan, John Murray Exp., v, pp. 137–140.

Gen. Funchalia Johnson

1867. Johnson, Proc. Zool. Soc. Lond., p. 895.
1905. Bouvier, C.R. Ac. Paris, cxl, p. 981 (*Hemipenaeopsis*).
1905. *Id.*, *ibid.*, p. 982 (*Grimaldiella* = post-larval stage).
1908. *Id.*, Res. Sci. Camp. Monaco, fasc. xxxiii, p. 91.
1925. Balss, D. Tiefsee Exp., xx, p. 227.
1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, pp. 10, 11.

1934. Burkenroad, Bull. Amer. Mus. Nat. Hist., lxviii, pp. 76, 77 (subgen. *Pelagopenaeus*).

1936. *Id.*, Bull. Bingham Ocean. Coll., v, pp. 126 *sqq.*

1940. *Id.*, Ann. Mag. Nat. Hist. (xi), vi, p. 36.

Carapace with 3 lateral longitudinal keels, the middle and lower ones connected by a transverse keel; hepatic spine (if present) on the middle keel. Rostrum without (*Funchalia* s.s.) or with (*Pelagopenaeus*) teeth on lower edge. No orbital angle. Flagella of ant. 1 long. Mandible with elongate, scythe-like incisor process. Maxilla 2 with only 3 endites. Mxp. 3 with epipod. Rudimentary exopods on all legs. A spine on 2nd and 3rd joints of 1st and 2nd legs. A lateral keel on 5th and 6th abdominal segments, distinct and continuous (*i.e.* not divided into short, inconspicuous ridges as in *Penaeus*, etc.). Telson with 3 pairs of fixed lateral spines. Petasma asymmetrical (*Funchalia* s.s., see *infra*) or symmetrical (*Pelagopenaeus*), simple, open. Thelycum a more or less simple depression. Pleopod 2 ♂ appendix masculina (see *infra*). Terminal (7th) joint of mxp. 3 sexually dimorphic: lanceolate in ♂, subulate in ♀.

Funchalia (*Funchalia*) *woodwardi* Johnson

Fig. 112.

1867. Johnson, *l. c.*, p. 895.

1908. Bouvier, *l. c.*, p. 93, pl. 1, fig. 7 (part).

1920. Sund, Rep. "Michael Sars" Exp., iii, pt. 2, p. 32.

1922. Bouvier, Res. Sci. Camp. Monaco, lxii, p. 13.

1925. Calman, *l. c.*, p. 10, pl. 2, fig. 5, pl. 3, figs. 6–8 (references, but not Lenz and Strunck, 1914; see Burkenroad).

1936. Burkenroad, *l. c.*, pp. 131–135.

? 1938. Ramadan, John Murray Exp., v, p. 63, fig. 9 (carapace) (? *woodwardi* or *villosa*).

1938. Roger, Bull. Soc. zool. Fr., lxiii, p. 23, figs. 1–4 (mand. prp. 1, telson, thelycum).

Body pubescent. Rostrum with 11(–13) teeth. A small hepatic spine with strong keel behind it, and an inconspicuous denticle (shown in Calman's figure) on antennal angle of carapace. A keel on the hinder part of 6th abdominal segment below the mid-lateral one. Telson extending to level of tooth on outer margin of outer ramus of uropod. Dactyl of 4th leg half the length of 6th joint.

Petasma of adult ♂ asymmetrical, both halves forming simple folded tubes, the one half longer than the other and apically expanded

(fig. 112, *e*); in 11 examples this occurs on the left side, in 5 on the right side (one of the latter figured). Appendix masculina of pleopod 2 ♂ obconical (cf. *Macropetasma*), its anterior margin armed with close-set spines, its posterior margin with long stiff setae (fig. 112, *f*).

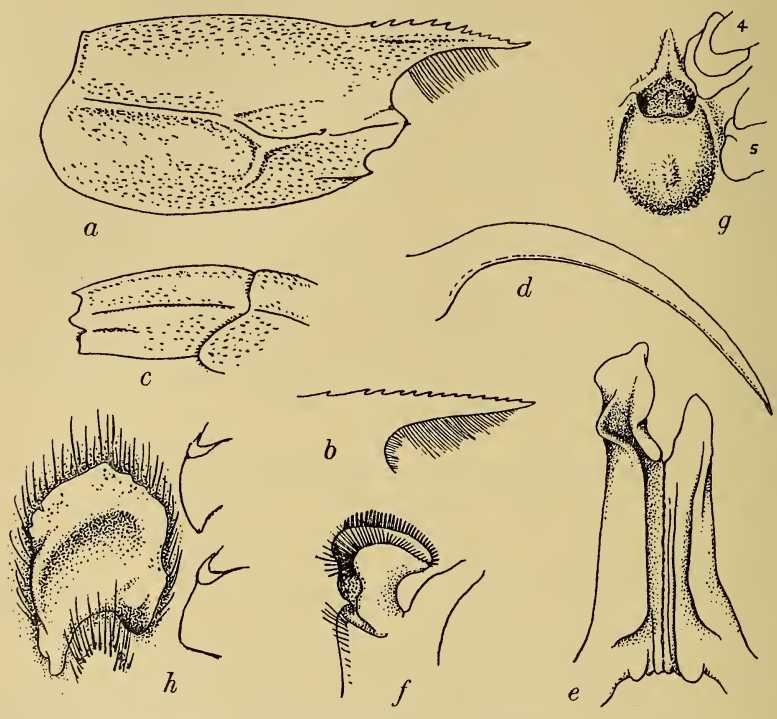


Fig. 112.—*Funchalia woodwardi* Johnson. *a*, carapace. *b*, rostrum. *c*, 6th abdominal segment. *d*, incisor process of mandible. *e*, petasma ♂, hind view. *f*, appendix masculina of pleopod 2 ♂. *g*, thelycum ♀. *h*, thelycum ♀. (*a*, *c*, *g* after Colman.)

Thelycum of adult ♀ a white chalky mass, slightly asymmetrical in outline, with an asymmetrical oblique ridge and depression (fig. 112, *h*).

Length up to 157 mm. (Calman: Johnson's type). More or less reddish, especially at the junctions of the abdominal segments and of the joints of the legs, and on the telson.

Localities.—Off Cape Point, 135 fathoms (Calman); off Table Bay (stock-fish grounds) (S. Afr. Mus.).

Distribution.—Eastern N. Atlantic and south-eastern S. Atlantic.

Remarks.—The adult ♂ petasma and the ♀ thelycum are described and figured from 22 specimens (16 ♂♂, 6 ♀♀) caught Jan.–Feb. 1943

and acquired by the South African Museum.* They were taken from the stomachs of stock-fish (*Merluccius*) and all are slightly mutilated. The rostrum of one ♂ resembles Bouvier's figure (1908, pl. 15, fig. 2) with 13 teeth, of which 3 are behind the orbit, the posterior one remote from the others; rostra of the others mutilated. These seem to be the first *woodwardi* ♂♂ with fully developed petasma to be captured and described; they range from approximately 100–130 mm. in length.

Gen. Solenocera Lucas

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 66.

1924. Gurney, "Terra Nova" Rep., zool., viii, p. 73 (larval forms).

1934. Burkenroad, Bull. Amer. Mus. Nat. Hist., lxviii, pp. 65, 68 *sqq.*

1936. *Id.*, Bull. Bingham Ocean. Coll., v, p. 120.

1938. Ramadan, John Murray Exp., v, p. 56.

1938. Burkenroad, Zoologica, xxiii, p. 61.

1939. *Id.*, Bull. Bingham Ocean. Coll., vi, p. 6.

1941. Lindner and Anderson, J. Wash. Ac. Sci., xxxi, p. 181 (key to Atlantic species).

Carapace with cervical groove extending dorsally, interrupted only at the mid-dorsal line; post-orbital tooth (submarginal) present. Flagella of ant. 1 long, compressed, concave on inner side, forming when juxtaposed to their fellows a respiratory tube. A small tubercle on eye-stalk. Exopods on all mxp. and legs. Epipods on mxp. 2 and 3 and all legs. Two arthrobranchs (the anterior one filamentous) on the segment of 4th leg. Telson trifid, without movable spines. Appendix masculina on pleopod 2 ♂ (so far as known) bilamellate.

Remarks.—The distinctive feature of this genus is the modification of the flagella of 1st antennae; also, the posterior raised (more strongly chitinized) portion of abdominal segment 1 is very narrow mediodorsally.

Key to the South African Species.

1. Rostrum shallow, lanceolate, with 5–7 teeth, of which 3–4 are behind orbit. A post-rostral keel (fig. 113, *a*).
   a. Apex of each half of petasma bilobed (fig. 113, *e*).
      i. Ant. 1 $1\frac{2}{3}$ times length of carapace (incl. rostrum). 5th leg reaching to end of eyes . . . *siphonoceras.*

* Through the kindness of Mr. Rattray, formerly of the Low Temperature Laboratories, Cape Town, while studying the food and diseases of the stock-fish.

ii. Ant. 1 twice length of carapace (incl. rostrum). 5th leg reaching to end of peduncle of ant. 1 . *africanum.*

b. Apex of each half of petasma trilobed (fig. 113, *h*) . *algoense.*

2. Rostrum deep, cultrate, with 4–5 teeth, of which 2 are behind orbit. No post-rostral keel (fig. 113, *j*) . . . *comatum.*

Solenocera siphonoceras (Phil.) *

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 417 (*Penaeus membranaceus* Risso).

1840. Philippi, Arch. Naturg., Jahrg. 6, p. 190, pl. 4, fig. 3 (*Penaeus s.*).

1893. Stebbing, Hist. Crust., p. 217 (*siphonoceras*).

1910. Kemp, Fish. Irel. Sci. Invest., 1908, p. 20, pl. 2, figs. 1–8 (*siphonocera*).

1916. Balss, Beitr. Kenntn. Meeresf. Westafr., ii, p. 14.

1923. Stephensen, Dana Ocean. Exp., ii, D3, p. 16 (*siphonocera*).

1925. Balss, D. Tiefsee Exp., xx, p. 226 (*membranacea* M. Edw.).

1934. Burkenroad, *l. c.*, pp. 69–71 (*membranacea* M. Edw.).

1938. Heldt, Ann. Inst. ocean. Paris, xviii, pp. 42, etc., figs. 4, 19, 20, 21 (petasma), 22 (app. masc.), etc. (reproduction, development).

Carapace ? glabrous. Rostrum reaching nearly to end of eyes, with 5–7 teeth, of which 3–4 are behind the orbit; post-rostral keel disappearing in posterior third of carapace (Kemp); small orbital, antennal, and pterygostomial spines present, and a stronger post-orbital one; no branchiostegal spine. Mandibular palp with 2nd joint triangular, rapidly tapering; cutting-edge undulate. Ant. 1 about $1\frac{2}{3}$ times length of carapace (incl. rostrum). 2nd joint of 1st and 2nd legs and 3rd joint of 1st leg each with a spine. 4th leg shorter than 5th, the latter reaching to end of eyes. 3rd abdominal segment faintly, 4th–6th segments distinctly keeled, the keel on 6th segment ending in a short spine; a small spine distally on ventral margin of 6th segment. Telson about as long as outer ramus of uropod. Petasma: each half apically bilobed, the length of the coupling-margin

* If the species which M. Edwards *attributed to Risso* and *re*-described as Risso's species is actually the same as Risso's, the name should be *membranaceum* Risso. But if the two are not the same, the combination "*Penaeus membranaceus*" of M. Edwards (or anyone else) cannot be used for M. Edwards' species (or any other species). Philippi's name is clearly the correct one to use if there is any doubt about Risso's species (see Stebbing, 1893). As Philippi's paper is not available here, I have used the termination "cer-*as*" (as in Stebbing, 1893), though Bouvier (1908) and Stebbing (1917) use "cer-*os*."

about half the total length, outer lobe longer than inner. (Description after Kemp.) Thelycum, pleopod 1 ♀, and pleopod 2 ♂ ?.

Length up to 71 mm. (Kemp). Reddish buff in general (Kemp).

Localities.—Outside Table Bay, and on Agulhas Bank, 117–178 metres (Balss); 40 miles N.W. of Cape Town, 150 fathoms (Burkenroad).

Distribution.—Mediterranean, eastern Atlantic from Ireland to Senegambia, Azores.

Remarks.—Balss stated that his specimens were compared with Mediterranean examples, and that they did not belong to *africanum*; also that *africanum* was based on unimportant differences, but differences from what species was not stated; if he meant *membranacea*, how did he differentiate his South African specimens from *africanum* ?

Burkenroad's specimen had longer 1st antennae than typical *siphonoceras*, but also a keeled 3rd abdominal segment (as in *africanum*, and contrary to Kemp's description).

Until we have a detailed description of *siphonoceras*, *africanum* may be allowed to stand as a distinct species.

Solenocera africanum Stebb.

Fig. 113, *a–c* (type ♀), *d–g* (♂).

1917. Stebbing, Ann. S. Afr. Mus., xvii, p. 32, pl. 4, fig. A (Crust. pl. 93, fig. A).

1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 10 (*Solenocera* sp.).

1934. Burkenroad, *l. c.*, pp. 70, 71.

1939. *Id.*, *l. c.*, p. 6.

Type ♀. Carapace glabrous, faintly and sparsely punctate, mainly near the post-rostral keel, with a few minute setules behind antennal angle, and with a clearly demarcated (symmetrical on the two sides) pilose area alongside the dorsal teeth as far as the oblique lateral keel on rostrum. Rostrum reaching not quite to tips of eyes, shallowly lanceolate, dorsal teeth 7, the foremost one minute, 3 behind orbit; post-rostral keel scarcely notched by the cervical groove, extending nearly to hind margin of carapace. A small orbital spine; antennal and pterygostomial spines also small, post-orbital and hepatic spines larger. A conspicuous hollow behind the (marginal) pterygostomial spine. An inconspicuous notch in cervical ridge above hepatic spine (but no spine as shown by Stebbing). Ant. 1 twice as long as carapace (incl. rostrum). Mandibular palp and cutting-edge as in *siphonoceras*.

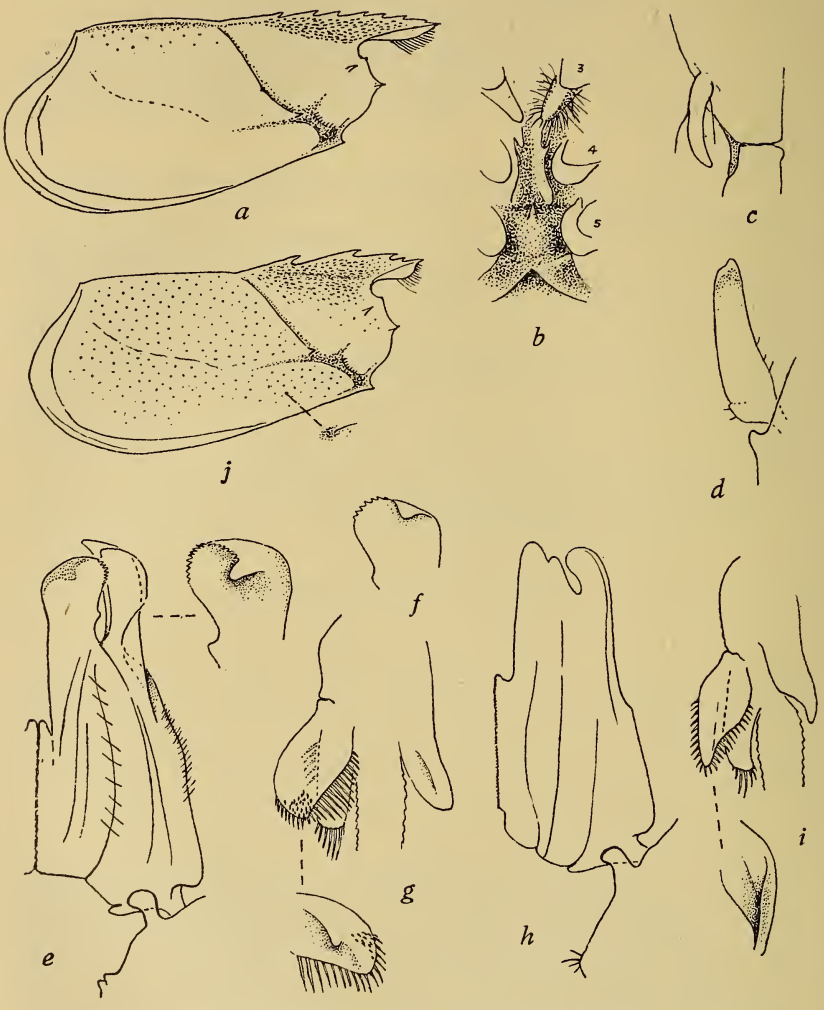


FIG. 113.—*Solenocera africanum* Stebb. *a*, carapace of type ♀. *b*, thelycum. *c*, pleopod 1 ♀. *d*, pleopod 1 of juv. ♂ 37 mm. in length. *e*, one-half of petasma of ♂ 61 mm., posterior view, with anterior view of apex of inner lobe further enlarged. *f*, anterior view of apex of inner lobe of ♂ 46 mm. *g*, anterior view of left pleopod 2 ♂, with posterior view of median lobe of appendix masculina, exopod omitted.

Solenocera algoense Brnrd. *h*, one-half of petasma of ♂ 63 mm. (but possibly not quite adult). *i*, anterior view of left pleopod 2 ♂, with posterior view of median lobe of appendix masculina, exopod omitted.

Solenocera comatum Stebb. *j*, carapace of type ♂.

2nd joint of 1st and 2nd legs, and 3rd joint of 1st leg each with a spine. 4th leg reaching to tip of eye, 5th leg to end of peduncle of ant. 1. 3rd–6th abdominal segments distinctly keeled, the spine at end of 6th broken off; 6th segment a little shorter than 5th, postero-inferior angle of 5th rounded-quadrate; a small denticle distally (at about $\frac{3}{4}$ length) on ventral margin of 6th segment (concealed amongst long plumose setae). Telson scarcely as long as *inner* ramus, distinctly shorter than outer ramus, of uropod. Sternites (fig. 113, *b*): coxal lobes of 3rd legs prominent, ridge-like, strongly setose, hollow between 4th coxae bounded by a thin ridge bearing a spine (or sharp tooth) (inconspicuous), between 5th coxae a low median boss bearing a spiniform tubercle, posteriorly a transverse plate; 5th coxa bluntly dentiform anteriorly. Endopod of pleopod 1 slightly in-curved (towards peduncle), with 2 long setae. Length 65 mm. (Stebbing: 70·5 mm., apparently measured on the curve).

Localities.—Off Sebastian Bluff (Agulhas Bank), 34 fathoms (Stebbing); off Durban, 22 fathoms (Calman); off Cape Point, 45 and 85 fathoms (S. Afr. Mus.); off Struys Point, 42 fathoms, Cape St. Blaize, 25 fathoms, and Algoa Bay, 57 fathoms (S. Afr. Mus.).

Remarks.—Of Stebbing's type ♂ there is in the South African Museum only a slide containing the mandible and mxp. 2. The petasma is missing. When unmounted the mandible showed no unusual features, and the difference in the lengths of the terminal and penultimate joints of mxp. 2 is inappreciable.

The re-examination of the type ♀, and the examination of additional material in the South African Museum, goes to show that Burkenroad's opinion is probably correct: that *africanum* cannot really be separated from *siphonoceras*, and perhaps does not deserve even varietal rank. As already remarked, however, there are several details of *siphonoceras* (*e.g.* surface of carapace, details of petasma and pleopod 2 ♂) which are not given in descriptions (at least not in those available to me), with which *africanum* should be compared before finally relegating it to synonymy.

In the present material the differences from *siphonoceras* seem to be: shorter telson, longer 1st antennae, longer 4th and 5th legs, and a distinct keel on 3rd abdominal segment (in addition to the keels on 4th–6th segments).

As in the case of *comatum* (*infra*) Stebbing has very evidently examined and drawn the petasma only *after* mounting on a slide. The varying thickness and degree of chitinization seen by transmitted light through the flattened appendage misled him to describe the apex

of the inner lobe as bidentate. Kemp's fig. 2 (*l. c.*, 1910), though giving a faint indication, fails to give a true representation of the real structure owing to the small size of his drawing. When the petasma is examined loose, the "bidentate" appearance is seen to be due to a stout thickened tooth on the anteriorly overturned distal margin; external to this tooth the margin is denticulate or serrate, a detail which appears in neither Kemp's nor Stebbing's figures. The apex of the outer lobe is composed of 2 laminae, closely appressed and free only at their edges.

Pleopod 2 ♂. The process curving outwards from base of endopod bears a short ridge on its anterior surface. The anterior lobe of appendix masculina is spatulate, its median margin ridged (*not* flattened), the median border of the hollowed posterior surface formed by a projecting keel (fig. 113, *g*).

A spiniform process, more or less uncinately curved forwards, on each of abdominal sternites 1–5, strong on 1st, small on 5th, in both sexes, but tending to become bluntened in adult.

The present material comprises ♂♂ 37–61 mm., ♀♀ 62 and 73 mm., and juveniles from 25–32 mm. in length. In the 46 mm. ♂ the two halves of the petasma are not coupled together; and in the 37 mm. specimen each half is a simple digitiform process (fig. 113, *d*). There are 21 specimens with 6, and 7 with 7 rostral teeth.

Solenocera algoense Brnrd.

Fig. 113, *h*, *i*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 383.

♂. 63 mm. in length. Rostrum with 6 teeth, 3 behind orbit, apex up-turned. Surface of carapace as in *africanum*, but more strongly and closely punctate dorsally behind the cervical groove. Indentation on latter (above hepatic spine) barely traceable; other spines as in *africanum*. Abdominal segments more strongly punctate; 3rd–6th segments keeled, keel on 6th ending in a spine, a denticle on lower distal margin of 6th segment. A strong blunt tooth-like (laterally compressed) process on 1st abdominal sternite, and a small conical setiferous tubercle on each of 2nd–5th sternites (very small on 5th). Telson a little longer than inner ramus and slightly longer than outer ramus of uropod. Ant. 1 twice length of carapace (incl. rostrum). Mandbular palp as in *siphonoceras*. Spines on 1st and 2nd legs as in *siphonoceras* and *africanum*; 4th leg reaching to end of peduncle of ant. 1, 5th leg longer. Petasma, the two halves not coupled together,

no trace of serration or other armature on the apices of the lobes, and therefore probably not quite fully developed. Pleopod 2 ♂, appendix masculina with anterior lobe spatulate (hollowed on posterior surface), the median edge flattened.

Locality.—Off Nanquas Peak (eastern portion of Algoa Bay), 50 fathoms (S. Afr. Mus.).

Remarks.—Although apparently not quite mature, the petasma of this 63 mm. ♂ is quite distinct from that of the 47 mm. ♂ *comatum* (*infra*) and the 61 mm. ♂ *africanum*.

Solenocera comatum Stebb.

Figs. 113, *j*, 114.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 67, pls. 13, 14 (Crust., pls. 77, 78).

1939. Burkenroad, *l. c.*, p. 6.

Type ♂. Carapace with rather numerous minute punctae, most of them with a minute setule, more numerous and closely-set on the rostral and post-orbital areas, which can be described as definitely pilose or pubescent. Rostrum extending very little beyond base of cornea, rather deep and cultrate, the lower margin strongly arcuate, dorsal teeth 4, the foremost one smaller than the others, 2 behind orbit; post-rostral keel obsolete behind cervical groove. Orbital angle without spine, antennal and pterygostomial spines small, hepatic and post-orbital spines larger. Lower portion of cervical groove of nearly uniform depth, without a conspicuous hollow behind the pterygostomial spine. Ant. 1, $1\frac{1}{2}$ times length of carapace (incl. rostrum). Mandibular palp and cutting-edge as in *siphonoceras*, but the basal width of terminal joint of palp less than width of basal joint (as in Stebbing's figure). 2nd joint of 1st and 2nd legs and 3rd joint of 1st leg each with a spine (4th and 5th legs have been removed from specimen). 4th–6th abdominal segments dorsally keeled, the 6th ending in a small spine; 6th segment a little longer than 5th, postero-inferior angle of 5th quadrate (contrast *africanum*); a small denticle below postero-inferior angle of 6th segment. A small median setiferous tubercle on abdominal sternites 2–5 (1st segment defective), very small on 5th. Telson a little shorter than inner ramus and only $\frac{3}{4}$ length of outer ramus of uropod. Petasma: the two halves in contact (along coupling-margin) for about $\frac{2}{3}$ total length of lobes, inner lobe longer than outer, apically expanded, with distal margin overturned anteriorly (dorsally), the whole margin serrate; middle lobe

somewhat uncinate, pointing medianly, the bent-over margin strongly serrate; outer lobe apically more strongly chitinized, with a rounded projecting flap on anterior (dorsal) surface; on the peduncle an anvil-shaped flap posterior to the base of the petasmal plate (cf. *melantho* de Man, Siboga Exp. monogr., xxxix*a*, 1913 (atlas), pl. 5, fig. 12, *e*). Pleopod 2 ♂, the process on outer side of base of endopod somewhat spatulate or boat-shaped, hollowed on its proximal side, lying behind (ventral to) the exopod, appendix masculina of two opposable flaps,

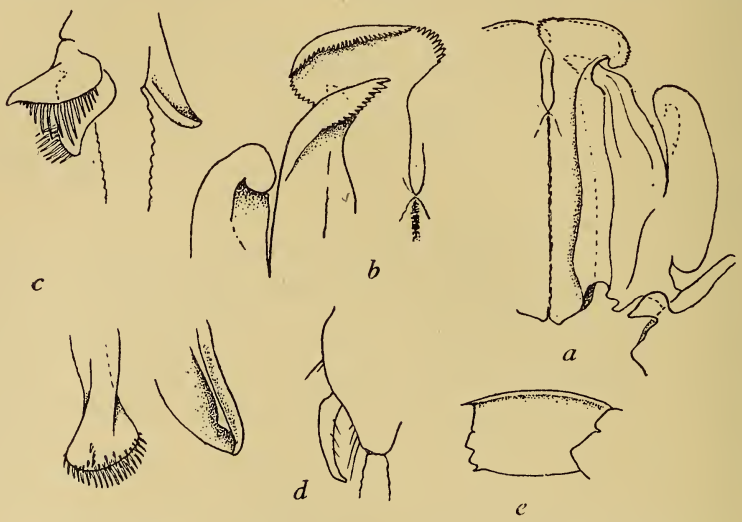


Fig. 114.—*Solenocera comatum* Stebb. *a*, posterior view of one-half of petasma ♂. *b*, anterior view of apex of same, further enlarged. *c*, anterior view of left pleopod 2 ♂, with posterior views of the two lobes of the appendix masculina, exopod omitted. *d*, pleopod 1 ♀ 33 mm. *e*, 6th abdominal segment ♂.

both armed with strong spines, the anterior one spatulate with median edge flattened, the posterior one twisted (true shape only seen from posterior side). Length 47 mm.

Type ♀. Only a slide was available with the dried-up remains of appendages of which only the 1st pleopod could be saved. This has the form figured by Stebbing, but the question may be asked whether it is really a ♀ and not a young ♂.

Localities.—Off East London, 43–50 fathoms (Stebbing): near Gt. Fish Point, 30 and 53 fathoms (S. Afr. Mus.).

Remarks.—Stebbing apparently did not describe the appendages until after they had been mounted in glycerine jelly on a slide; hence the defectiveness of his description and figure of the petasma.

The two juv. ♀♀, 32 mm. in length, from near Gt. Fish Point, have the endopod of pleopod 1 as in fig. 114, *d*. There is a straight spiniform setiferous process on 1st abdominal sternite, and a small setiferous conical tubercle on each of 2nd–5th sternites (as in ♂).

Gen. Hymenopenaeus S. I. Smith

1882. S. I. Smith, Bull. Mus. Comp. Zool. Harv., x, p. 91.

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 273 (*Philonicus* part).

1888. *Id.*, *ibid.*, p. xii (*Pleoticus*, nom. nov. for *Philonicus* preocc.).

1888. *Id.*, *ibid.*, p. 284 (*Haliporus* part).

1911. de Man, *l. c.*, pp. 7, 31 (*Haliporus*).

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 20 (*Haliporoides*).

1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, pp. 9, 10 (*Haliporus*).

1936. Burkenroad, Bull. Bingham Ocean. Coll., v, p. 102 (references).

1938. Ramadan, John Murray Exp., v, p. 57.

Carapace with cervical groove extending to mid-dorsal line; post-orbital tooth present; branchiostegal and pterygostomial spines one or the other or both either present or absent. Appendage on inner margin of basal joint of ant. 1 moderately long, flexible, twisted. One or both of the flagella of ant. 1 very long, filiform. A small tubercle on eye-stalk. Exopods on all mxp. and legs. Epipods on mxp. 2 and 3, and 1st–4th legs. Two arthrobranchs on the segment of 4th leg; a podobranch on mxp. 2, but none on the appendages posterior to it. Telson trifid, without movable lateral spines.

Remarks.—Burkenroad restricts *Haliporus* Bate 1881 to Bate's genotype *curvirostris* and Faxon's *thetis*, characterized by having podobranchs on some of the appendages behind mxp. 2, mobile spines on telson (as well as the fixed spines forming the trifid apex), and a short rigid appendage on inner margin of basal joint of ant. 1.

Calman regards the 3-jointed mandibular palp, which characterizes *Haliporoides triarthrus* (and also *Haliporus sibogae* de Man), as an inadequate basis for generic separation; and Burkenroad also places Stebbing's genus in synonymy. Stebbing's name, however, might be retained as a subgeneric or sectional name.

Hymenopenaeus (*Haliporoides*) *triarthrus* (Stebb.)

Knife-Prawn.

Fig. 115.

1914. Stebbing, *l. c.*, p. 21, pls. 6, 7 (Crust., pls. 70, 71).

1921. Gilchrist, Fish. Mar. Biol. Surv. Rep., i, pp. 45, etc. (localities).
1925. Calman, *l. c.*, p. 9.

Whole body, including thoracic and abdominal sternites, and peduncles of pleopods, finely pubescent (or minutely hispid). Rostrum large, strongly arcuate, 10 dorsal teeth, of which 2 behind orbit, 2 ventral teeth; no post-rostral keel. Carapace with pterygostomial

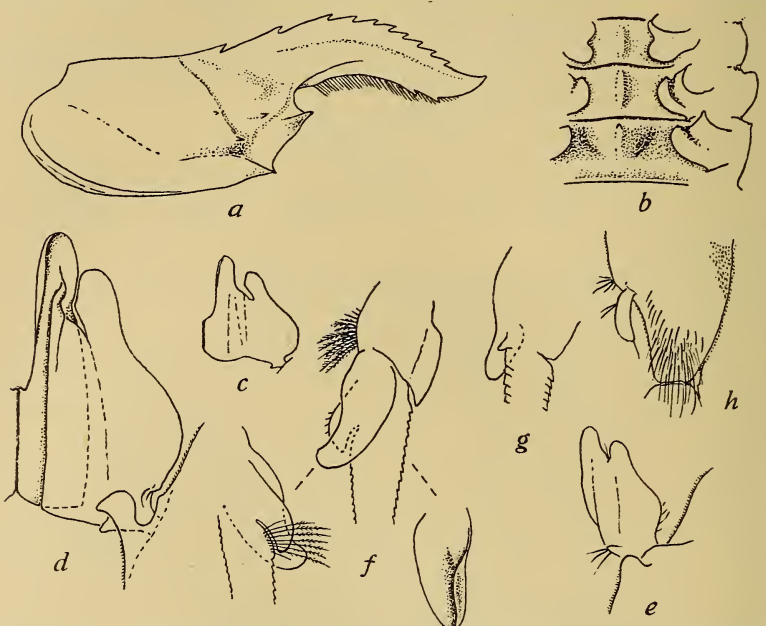


Fig. 115.—*Hymenopenaeus* (*Haliporoides*) *triarthrus* (Stebb.). *a*, carapace, pubescence not shown. *b*, 3rd–5th sternites, with profile. *c*, one-half of adult petasma, expanded, lobe on peduncle omitted. *d*, one-half of petasma, folded. *e*, pleopod 1 (developing petasma) juv. ♂ *ca.* 80 mm. in length. *f*, anterior view of left pleopod 2 ♂, with posterior view of the two lobes, and medio-posterior view of one of them. *g*, anterior view of pleopod 2 juv. ♂. *h*, pleopod 1 ♀, the pubescence actually covers whole peduncle, though only partly shown.

spine, and a minute spine (very inconspicuous, obsolete in the largest specimens) on the cervical ridge above the hepatic tooth; no orbital tooth, the orbital margin being an even curve. Both flagella of ant. 1 much longer than length of animal (in a specimen *ca.* 85 mm. the outer flagellum is *ca.* 130 mm., the inner *ca.* 200 mm.). Flagellum of ant. 2 also very long. Mandibular palp distinctly 3-jointed. No spines on proximal joints of 1st or 2nd legs; 3rd leg reaching to end of antennal scale, 4th extending beyond 3rd, and 5th beyond 4th. Coxal lobe of 3rd leg rather strong; and a blunt tooth on antero-median corner of 5th coxa in adult ♂. 4th–6th abdominal segments keeled, each

keel ending in a short spine; postero-inferior corners of 5th and 6th segments rounded. Telson shorter than uropods. Sternites of both ♂ and ♀ similar (figs. 115, *b*), a median ridge on each segment between bases of 3rd–5th legs, that between 4th legs slightly the highest, that between 5th legs with a small tubercle anteriorly. Petasma simple, folded, when fully expanded each half about as broad as long, inner lobe longer than outer, somewhat spatulate; the somewhat knob-like lobe on the peduncle quite separate from the actual attachment-stalk of the petasma (de Man's fig. 10, *i*, of *sibogae* is in this respect ambiguous, if not actually misleading). Appendix masculina on pleopod 2 ♂ of 2 lobes, the anterior one flattened distally on its median surface, and concave on posterior surface, margin entire.* Endopod of pleopod 1 ♀ digitiform.

Length up to 150 mm. (Calman).

Localities.—Off East London, 250–300 fathoms (Stebbing, and S. Afr. Mus.); off Durban, 160–300 fathoms (Calman, and Fishery Survey Rep.); off Table Bay (Lion's Head S.E. × E. distant 50 miles), 230 fathoms (S. Afr. Mus., 1 juv.).

Remarks.—Close to *sibogae* de Man 1907 (also descr. and figd., *l. c.*, 1911 and 1913), from the East Indies, which differs in the less arcuate rostrum and the fewer rostral teeth $\left(\frac{6\text{–}9}{1\text{–}2}\right)$. The sternites and petasma of the two species are very similar. But before making *triarthrus* a synonym, it would be advisable to compare actual petasmas of the two species, and also the 2nd pleopods.

In the South African Museum there are the appendages from Stebbing's type ♀, and 11 topotypes, including a ♂ 132 mm. and a ♀ 120 mm. in length. The petasma and 2nd pleopod of an immature ♂ 80 mm. in length are figured. The juvenile from off Table Bay measures 38 mm., with rostral formula $\frac{9}{2}$.

Known to the crew of the Survey vessel, and recorded in the Fishery Survey Reports, as the Knife-Prawn on account of its prominent rostrum.

Gen. Plesiopenaeus Bate

1881. Bate, Ann. Mag. Nat. Hist. (5), viii, p. 188 (part).

1888. *Id.*, Rep. H.M.S. *Challenger*, xxiv, p. 309 (*Aristeus* part).

* In this species, more so than in *Solenocera* (figs. 113, 114), the position of the posterior lobe strongly supports Burkenroad's suggestion (*l. c.*, 1936, p. 100, footnote) that this lobe represents the appendix *interna*.

1891. Wood-Mason and Alcock, Ann. Mag. Nat. Hist. (6), viii, p. 282 (*Aristaeopsis*).

1901. Alcock, Cat. Ind. Deep-Sea Crust., pp. 35, 40 (*Plesiopeneus* [sic] and *Aristaeopsis*).

1908. Bouvier, Res. Sci. Camp. Monaco, fasc., xxxiii, pp. 61, 63 (*Aristaeopsis* and *Plesiopenaeus*).

1936. Burkenroad, Bull. Bingham Ocean. Coll., v, p. 94.

1938. Ramadan, John Murray Exp., v, p. 49.

Carapace with cervical groove distinct or obsolete; post-antennal and marginal pterygostomial spines present; no orbital or hepatic spines; rostrum elongate in both sexes, or long in ♀ and short in ♂, tridentate (abnormally 2–4 dentate). No lobe or scale on inner margin of basal joint of ant. 1; outer (upper) flagellum short, dorso-ventrally flattened, inner flagellum elongate. Exopods on legs minute (if present). Podobranchs on mxp. 2 and 3, and 1st–3rd legs; epipods on all mxp. and 1st–4th legs. Exopod of mxp. 2 often very long. Exopods of anterior pleopods long.

Remarks.—Sexual dimorphism may occur in the length of the rostrum, and of the antennal scale, the shape of the proximal part of the long inner flagellum of ant. 1, and the terminal joint of mxp. 3. Atlantic and Indo-Pacific.

Key to the South African Species.

1. 4th–6th abdominal segments keeled. Inner flagellum of ant. 1 and apical joint of mxp. 3 modified in ♂. In ♀ a shield-shaped plate on 4th thoracic sternite . . . *nitidus.*
2. 3rd–6th abdominal segments keeled. Antennal scale produced in a long process in ♂. In ♀ a shield-shaped plate on 5th thoracic sternite . . . . . *edwardsianus.*

Plesiopenaeus nitidus Brnrd.

Fig. 116.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 383.

Carapace glabrous; cervical groove obsolete except in lower part, a shallow groove below hepatic area, continued faintly towards hind margin of carapace; rostrum tridentate, teeth equally spaced or the 1st and 2nd nearer to one another, middle one in advance of orbital margin; no post-rostral keel; in some specimens (♂ ♀) a minute median tubercle near hind margin of carapace. Inner flagellum of ant. 1 in ♂ expanded on ventral margin just beyond apex of outer flagellum.

Exopod of mxp. 2 extending to base of antennal scale; exopod of mxp. 3 about as long as that of mxp. 2, extending nearly to end of 4th joint (of mxp. 3). Mxp. 3 extending $\frac{3}{4}$ along antennal scale, and a little farther than 3rd leg, terminal joint modified in ♂ (fig. 116, *g*). Terminal joint of mandibular palp triangular, inner margin not (or scarcely) emarginate. 1st–3rd legs increasing in length, 3rd extending

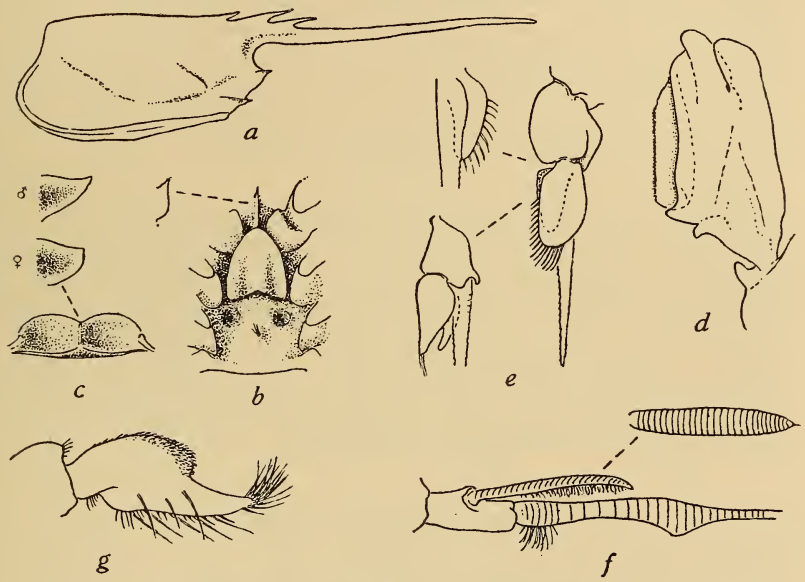


Fig. 116.—*Plesiopenaeus nitidus* Brnrd. *a*, carapace. *b*, thoracic sternites 3–5 ♀, with profile of spine between 3rd legs. *c*, sternite of 1st abdominal segment ♀, with profile of median keel in ♀ and ♂. *d*, one-half of petasma of ♂. *e*, anterior view of left pleopod 2 ♂, with posterior view (above) and external view after removal of exopod (below). *f*, externo-lateral view of right ant. 1 ♂, proximal part only of inner flagellum shown, with dorsal view of outer flagellum. *g*, terminal joint of mxp. 3 ♂.

half-way along antennal scale, all slender; 4th and 5th legs equally long, or 5th a little longer, extending nearly to spine on antennal scale; dactyls setiform, $\frac{1}{2}$ length of 6th joint. No spines (other than mobile spine-setae) on proximal joints of legs, but a minute spine on inner distal angle of 3rd joint of mxp. 3. 4th–6th abdominal segments keeled, keels ending in short spines; 3rd segment not keeled, but when viewed dorsally the hind margin is slightly dentiform in middle line. Postero-inferior corners of segments 1–5 rounded, a small tooth below the postero-inferior angle of 6th segment. Telson shorter than inner ramus of uropod, not grooved or keeled, with 3 pairs of lateral mobile

spines distally. Pleopod 1, exopod extending to base of antennal scale; petasma with the 2 halves rather feebly coupled, but appearing to be fully developed (fig. 116, *d*); pleopod 1 ♀ with small digitiform endopod arising midway along peduncle. Pleopod 2 ♂ with bilamellate appendix masculina, the posterior lobe ovoid, the anterior subtriangular, concealed, endopod short. Sternites of last 3 thoracic segments, and sternites of the abdominal segments similar in ♂ and ♀, but in ♂ the spine between bases of 3rd legs and the spines on the abdominal segments larger and more acute than in ♀; between bases of 4th legs a shield-shaped plate, partly covering (in ventral view) the coxal lobes of 3rd legs in ♀; between bases of 5th legs a lateral hollow on each side and a small median setiferous tubercle.

Length ♀ up to 150 mm., ♂ 110 mm.

Locality.—Off Cape Point, 475–630 fathoms (S. Afr. Mus.).

Remarks.—These 3 ♂♂ and 3 ♀♀ (coll. s.s. *Pieter Faure*) appear to differ from *armatus* (Bate), *edwardsianus* (Johnson), and *coruscans* (W-Mason and Alck.) in the modified antennular flagellum and 3rd maxilliped of the ♂. *A. antennatus* (Risso) has a modified antennular flagellum, and a modified terminal joint on mxp. 2 (Bouvier, 1908, pl. 12, fig. 4), but in the present species there is no modification of mxp. 2. Further, the carapace is very smooth.

Plesiopenaeus edwardsianus (Johnson)

1867. Johnson, Proc. Zool. Soc. Lond., p. 897.

1878. Miers, *ibid.*, p. 308, pl. 17, fig. 3 (mandible).

1892. Illustr. Zool. "Investigator," Crust., pl. 1, figs. 1 (♂), 2 (♀).

1901. Alcock, *l. c.*, p. 36.

1908. Bouvier, *l. c.*, p. 64, pl. 2 (coloured), pl. 13, figs. 13–17, pl. 14, figs. 1–8.

1925. Balss, D. Tiefsee Exp., xx, p. 223.

1938. Ramadan, John Murray Exp., v, p. 51 (*edwardisianus* [sic]).

Post-rostral keel sharp to end of gastric region, then becoming obsolete; middle rostral tooth directly above hind margin of orbit; a strong sharp ridge from orbit to cervical groove, and other ridges and longitudinal grooves well marked. Neither inner flagellum of ant. 1 nor apical joint of mxp. 3 modified in ♂, but antennal scale produced in a long narrow process in ♂. Exopod of mxp. 2 very long, rigid, extending to end of (or beyond) antennal scale; exopod of mxp. 3 extending scarcely to end of 4th joint (of mxp. 3). Terminal joint of mandibular palp deeply bifurcate. Dactyls of 4th and 5th legs

narrow lanceolate. 3rd–6th abdominal segments dorsally keeled, the keels ending in short points; postero-inferior corners of 3rd–5th segments each with a small point, and a small point below the postero-inferior corner of 6th segment. Telson distally flattened, obscurely channelled. Exopod of pleopod 1 extending to middle of antennal scale. In ♀ thoracic sternite 3 unarmed, on sternite 4 a triangular tooth with sharp forwardly-directed point, on sternite 5 an ovoid tubercle or shield-shaped plate. Median antrorse teeth on abdominal sternites 1 and 2 strong (stronger than in ♂ of *nitidus*).

Length up to 226 (Alcock) and 315 mm. (Bouvier). Deep crimson (Alcock, and Bouvier's coloured figure).

Distribution.—Madeira and Azores, West Indies, Indian Seas, Arabian Sea, east coast of Africa.

Remarks.—A single ♀, 185 mm. in length, is in the South African Museum. Although it has no locality label, there is very little doubt that it is part of the *Pieter Faure* collection, and in all probability came from a deep-water station off the Cape Point.

Gen. Aristaeomorpha W-Mason & Alck.

1891. Wood-Mason and Alcock, Ann. Mag. Nat. Hist. (6), viii, p. 286.

1901. Alcock, Cat. Ind. Deep-Sea Crust., p. 38.

1908. Bouvier, Res. Sci. Camp. Monaco, fasc. xxxiii, p. 52.

Carapace with cervical groove (for most part) distinct; spines as in *Plesiopenaeus* but with the addition of an hepatic spine; rostrum elongate but often shorter in ♂ than in ♀, multidentate. Ant. 1 as in *Plesiopenaeus*. Exopods on legs absent (? always). Podobranchs and epipods as in *Plesiopenaeus*. Exopod of mxp. 2 very long; of mxp. 3 short. Exopods of anterior pleopods long.

Remarks.—No sexual dimorphism except in the length of the rostrum.

Aristaeomorpha foliacea (Risso)

Fig. 117.

1826. Risso, Hist. Nat. Eur. merid., v, p. 29, pl. 2, fig. 6.

1892. Wood-Mason, Illustr. Zool. "Investigator," Crust., pl. 2, fig. 2 (*giglioniana*, nom. nud. Mediterranean specimen of *foliacea* figured for comparison, see Kemp and Sewell, 1912, Rec. Ind. Mus., vii, p. 19).

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 24 (*rostridentatus*) (not the references to W-Mason and Alcock, 1891, Alcock, 1901, Kemp and Sewell, 1912).

1925. Balss, D. Tiefsee Exp., xx, p. 221, figs. 1, 2 (*rostridentatus*).

1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 7 (synonymy).

1926. Schmitt, Biol. Res. "Endeavour," v, p. 313, pl. 57, figs. 1–3.

1933. Yokoya, J. Coll. Agric. Tokyo, xii, p. 3, fig. 1 (*Aristeus japonicus, fide* Burkenroad).

1936. Burkenroad, Bull. Bingham Ocean. Coll., v, p. 85.

1938. Ramadan, John Murray Exp., v, p. 53, fig. 5, *b* (carapace with short rostrum).

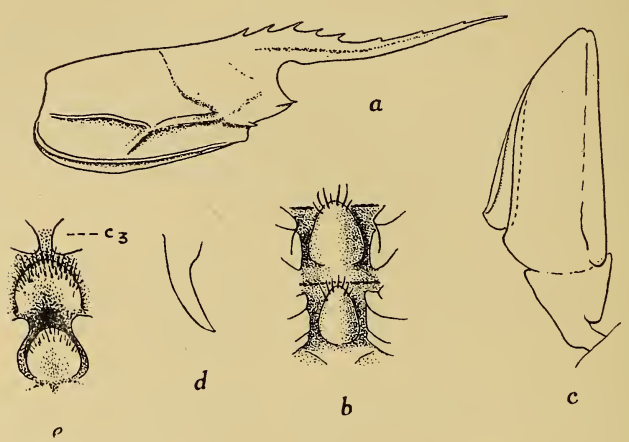


Fig. 117.—*Aristaeomorpha foliacea* (Risso). *a*, carapace of ♂ 123 mm. in length (pubescence omitted). *b*, 4th and 5th thoracic sternites ♂. *c*, one-half of petasma, not fully developed. *d*, lateral view (from right side) of spine on 1st abdominal sternite. *e*, thelycum.

Carapace finely pubescent; pterygostomial area 3·5–4 times as long as high; cervical groove indistinct dorsally, a well-marked groove below hepatic spine, from its hind end a low ridge to hind margin of carapace; rostrum with double curve, about equal in length (from orbital sinus) to rest of carapace, with (8) 10–12 teeth, of which 5–6 on the arched basal portion are larger than the distal ones; rostrum often shorter in adult ♂, lacking the distal slender portion (see Kemp and Sewell, 1912, *l. c.*, pl. 1, fig. 5). Apical joint of mandibular palp with inner basal corner produced, inner margin excavate. Exopod of mxp. 2 reaching nearly to spine on antennal scale, exopod of mxp. 3 nearly to end of 3rd joint (of mxp. 3). No exopods on legs. No (fixed) spines on proximal joints of anterior legs. 4th and 5th

legs very slender, especially the distal joints, dactyls about $\frac{1}{3}$ length of 6th joint (Calman: in the present ♂ $\frac{1}{2}$ length of 6th). 3rd–6th abdominal segments keeled, each keel ending in a short spine; postero-inferior corners of segments 1–5 rounded, a small spine below postero-inferior angle of 6th segment. Telson not quite reaching to end of inner ramus of uropod, with 3–4 pairs of lateral mobile spines. Outer ramus of uropod produced beyond the external spine for not more than $\frac{1}{7}$ its length. Petasma of juv. ♂, fig. 117. Pleopod 2 ♂ similar to that of *Plesiopenaeus nitidus* (*supra*). Sternites between 4th and 5th legs each with a shield-shaped plate. Sternites of abdominal segments 1–3 each with an ensiform process, of segments 4 and 5 with a short low medio-longitudinal keel.

Length up to 215 mm. (♀). Immature ♂ here figured 123 mm. (longirostrate). Red with blue ova (s.s. *Pieter Faure* log-book); reddish (Bouvier, 1908, coloured figure).

Localities.—Off East London, 250–310 fathoms (Stebbing, and S. Afr. Mus.); off Durban, 230 fathoms (Calman).

Distribution.—Mediterranean, eastern N. Atlantic, Fiji Is., Japan, S.E. Australia, East Indies (Balss: figure seems to indicate *foliacea* rather than *wood-masoni*).

Remarks.—Calman has separated the Indian form (*rostridentatus* W-Mason & Alck., non Bate) under the name *wood-masoni*. It has a deeper pterygostomial area on the carapace (*cf.* Kemp and Sewell, 1912, *l. c.*, pl. 1, figs. 5 and 6), and differs in certain other characters, which, it must be admitted, are of rather minor importance. Kemp and Sewell (1912) found no differences in the thelycum or petasma of the two forms. Balss gave a figure showing the petasma *in situ*, but this is quite useless for indicating any specific details. I have seen no figure of the fully developed petasma.

In the South African Museum there is the immature ♂ seen and recorded by Stebbing, and a juvenile 45 mm. in length from a nearby locality. I have seen a large ♀ from the Port Elizabeth Museum. It measures 175 mm. with broken rostrum; probably the full length would have been about 215 mm., the maximum given by Kemp and Sewell.

Gen. Gennadas Bate (restr. Burkenroad)

1881. Bate, Ann. Mag. Nat. Hist. (5), viii, pp. 171, 191.

1882. S. I. Smith, Bull. Mus. Comp. Zool. Harv., x, p. 86 (*Amalopenaeus*).

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 282 (references).

1922. Bouvier, Res. Sci. Camp. Monaco, fasc. lxii, p. 9.

1924. Gurney, "Terra Nova" Rep. zool., viii, p. 52 (larval stages).

1925. Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 3 (part).

1927. Balss, D. Tiefsee Exp., xxiii, p. 250 (*Amalopenaeus*).

1936. Burkenroad, Bull. Bingham Ocean. Coll., v, p. 59 (restricted, key to species).

1938. *Id.*, Zoologica, xxiii, p. 57.

Carapace with infra-antennal angle (if developed) pointing downwards; rostrum short, deep, unidentate. 2nd and 3rd peduncular joints of ant. 1 expanded. Exopod of mxp. 1 without distal segmented prolongation; 3rd joint of mxp. 2 expanded. Only a vestige of a gill on mxp. 1; no podobranchs on mxp. 3 or any of the legs. Only the 6th abdominal segment dorsally keeled. Telson apically truncate, with only a single pair of lateral mobile spines. Petasma always with "lobus accessorius" (see fig. 118). Appendix masculina on pleopod 2 ♂ bilamellate.

Remarks.—Burkenroad restricts the genus to include only those species which lack podobranchs behind mxp. 2. The species are closely allied and difficult to separate. The ♂ petasma and the ♀ thelycum are the two most useful characters.

Cosmopolitan; mostly pelagic, in contrast to *Benthesicymus* which is usually benthic.

Key to the South African Species (after Burkenroad).

Males (petasma).

1. Median lobe undivided (fig. 118, *e*).
   - *a.* External lobe undivided (fig. 118, *e*).
     - i. Both lobules of internal lobe spinulose, accessory lobe slender, clavate, inserted nearer inner margin . . . . . *capensis.*
     - ii. Only median lobule spinulose; accessory lobe broad, inserted nearer outer margin . . *kempi.*
   - *b.* External lobe divided; inner lobe not extending as far as external lobe, accessory lobe much less than half as broad as external lobe . . . . *elegans.*
2. External and median lobes both divided (fig. 118, *g*).
   - *a.* Lobules of median lobe subequal in breadth, not hooked or acuminate (fig. 118, *g*, *k*).
     - i. Outer lobule of external lobe longer than inner lobule. Lobules of median lobe short and stout . . . . . *valens.*

ii. Inner lobule of external lobe longer than outer. Lobules of median lobe long and rather slender . . . . . *gilchristi.*

b. Lobules of median lobe very unequal in breadth, external lobe much shorter than median (fig. 118, *i*, *o*).

i. Outer lobule of median lobe much broader than inner . . . . . *talismani.*

ii. Outer lobule of median lobe much narrower than inner, latter not acuminate . . *scutatus.*

Females (thelycum).

1. Orifices of seminal receptacles separate, not included in a common atrium (fig. 118, *f*, *n*).

a. Orifices widely separated, not guarded posteriorly by large prominences (fig. 118, *f*).

i. Transverse elevation of hind margin of 3rd sternite W-shaped, 4th sternite without rectangular elevation . . . . *capensis.*

ii. Transverse elevation of 3rd sternite Λ-shaped, 4th sternite with conspicuous rectangular elevation, its antero-lateral corners overlapping hind lips of orifices of receptacles . *kempi.*

b. Orifices not widely separated, guarded posteriorly by prominences. Posterior portion of 4th sternite without shield-shaped median elevation . . *elegans.*

2. Orifices of seminal receptacles lying within a common atrium (fig. 118, *l*).

a. A transverse pair of conspicuous tooth-like projections on 4th sternite; hinder lip of 3rd sternite not much produced; projections of 4th extending towards middle line.

i. Projections of 4th not meeting in middle line, not nearly reaching to anterior margin of 4th sternite . . . . . *valens.*

ii. Projections of 4th nearly meeting in middle line, reaching nearly to anterior margin of 4th sternite . . . . . *gilchristi.*

b. No transverse pair of projections on 4th sternite. Atrium between 3rd and 4th divided by a well-defined median longitudinal ridge, 4th with distinct anterior and posterior elevated areas.

i. Elevated area on 4th weakly separated into a short anterior and a long posterior portion by a transverse groove . . . . *talismani.*

ii. 4th with distinct anterior and posterior elevations. A free flap projecting forward from anterior margin of 5th nearly to anterior margin of 4th . . . . . *scutatus.*

Simplified First-Aid Key.

1. Infra-antennal angle acute.
   a. 4th joint of 3rd leg longer than 5th joint . . . *capensis.*
   b. 5th joint longer than 4th . . *gilchristi, valens, talismani, scutatus.*
2. Infra-antennal angle blunt. 4th joint of 3rd leg longer than 5th . . . . . *kempi, elegans.*

Gennadas capensis Calman

Fig. 118, *e*, *f*.

1925. Calman, *l. c.*, p. 5, pl. 1, figs. 1, 2 (antennal scale, petasma).

1936. Burkenroad, *l. c.*, p. 67, figs. 51, 53 (antennal scale, thelycum).

Antennal and infra-antennal angles pointed, branchiostegal (or pterygostomial) spine distinct, marginal; distance between cervical and post-cervical grooves (*cf.* fig. 118, *a*) dorsally about $\frac{1}{5}$ distance of latter from hind margin of carapace. Apex of antennal scale nearer to inner than to outer margin. 4th joint of 3rd leg slightly longer than 5th joint. Coxae of 4th and 5th legs ♀ enlarged, the enlargement on 4th leg being a narrow inwardly directed process. Petasma, fig. 118, *e*. Thelycum, fig. 118, *f*.

Length up to 40 mm. (Calman).

Locality.—Off Cape Peninsula, 1014 fathoms (Calman, also Burkenroad).

Distribution.—Bahamas, Bermuda, Gulf of Mexico.

Gennadas kempi Stebb.

Fig. 118, *a–d*.

1914 (June). Stebbing, *l. c.*, p. 283, pl. 27.

1914 (Dec.). *Id.*, Ann. S. Afr. Mus., xv, p. 12.

1925. Calman, *l. c.*, p. 4.

1927. Balss, *l. c.*, p. 260, figs. 14, 15.

1936. Burkenroad, *l. c.*, pp. 64 (in key), 68, 69, figs. 52, 54 (antennal scale, thelycum).

Antennal angle pointed, infra-antennal angle rounded, branchiostegal spine distinct. Apex of antennal scale symmetrically midway between inner and outer margins. 4th joint of 3rd leg longer than 5th joint. Petasma, fig. 118, *d*. Thelycum, fig. 118, *c*. No spine on sternite of 1st abdominal segment in either sex.

Length up to 31 mm. (Stebbing).

Localities.—Off Cape Point, 700–1000 fathoms (Stebbing); off

Cape Peninsula, 755–1014 fathoms (Calman); "Valdivia" St. 89, 31° 21′ S., 9° 46′ E. (Balss).

Distribution.—S. Atlantic.

Remarks.—There is no ♂ in the South African Museum, and as Stebbing's 1914 figure of the petasma is not very good, I have copied Balss' figure.

Gennadas elegans S. I. Smith.

Fig. 118, *m*, *n*.

1910. Kemp, Fish. Irel. Sci. Invest., 1908, p. 14, pl. 1, figs. 1–16 (*Amalopenaeus e.*).

1920. Sund, Rep. "Michael Sars" Exp., iii, pt. 2, p. 27.

1927. Balss, *l. c.*, p. 253, fig. 3.

1936. Burkenroad, *l. c.*, p. 71, fig. 55 (thelycum).

1938. Heldt, Ann. Inst. ocean. Paris, xviii, pp. 42, etc., figs. 71, etc. (reproduction, development).

[not *elegans* Stebbing 1917. =*gilchristi*.]

Antennal angle pointed, infra-antennal angle blunt, branchiostegal spine distinct. Apex of antennal scale symmetrical. 4th joint of 3rd leg slightly longer than 5th joint. Petasma, fig. 118, *m*. Thelycum, fig. 118, *n*.

Length up to 38 mm. (Kemp). Red, darker in front, paler on abdomen, eye-stalks with a jet-black spot, blue or purplish patches on mouth-parts and bases of legs, 1st antennae, and on sternites of abdominal segments 1–5 (Kemp).

Locality.—Balss quotes Stebbing's record, which, however, refers to *gilchristi*.

Distribution.—N. and S. Atlantic, Mediterranean.

Remarks.—The blue pigment is considered to be connected with some luminous function (Kemp, 1910, pp. 15, 16).

Gennadas valens (S. I. Smith)

Fig. 118, *k*, *l*.

1908. Bouvier, Res. Sci. Camp. Monaco, fasc. xxxiii, pp. 28 (in key), 44, pl. 1, fig. 3, pl. 9.

1914. Lenz and Strunck, D. Südpol Exp., xv, p. 311.

1936. Burkenroad, *l. c.*, p. 75, fig. 57 (thelycum).

Antennal and infra-antennal angles pointed, branchiostegal spine distinct; distance between cervical and post-cervical grooves about



FIG. 118.—*Gennadas kempi* Stebb. *a*, carapace. *b*, telson. *c*, thelycum. *d*, petasma (after Balss).
Gennadas capensis Calman. *e*, petasma. *f*, thelycum.
Gennadas gilchristi Calman. *g*, petasma. *h*, thelycum (Stebbings' specimen: *elegans*, non Smith).
Gennadas talismani Bouv. *i*, petasma (after Bouvier and Lenz & Strunck). *j*, thelycum.
Gennadas valens (S. I. Smith). *k*, petasma. *l*, thelycum.
Gennadas elegans S. I. Smith. *m*, petasma (after Smith). *n*, thelycum.
Gennadas scutatus Bouv. *o*, petasma. *p*, thelycum, flap on 5th sternite pulled back to show 4th sternite.

(*e*, *g*, after Calman; *f*, *j*, *l*, *n*. *p*, after Burkenroad; *k*, *o*, after Bouvier.)
(*e*, *i*, *m*, external, internal, and median lobes; *l.a.*, accessory lobe; *o.s.r.*, orifice of seminal receptacle. *a*, atrium.)

$\frac{1}{4}$ distance of latter from hind margin of carapace. 4th joint of 3rd leg shorter than 5th joint. Petasma, fig. 118, *k*. Thelycum, fig. 118, *l*.

Length up to 45 mm. (Bouvier).

Locality.—35° 39′ S., 8° 16′ E. (Lenz and Strunck).

Distribution.—Atlantic.

Gennadas gilchristi Calman

Fig. 118, *g*, *h*.

1917. Stebbing, Ann. S. Afr. Mus., xvii, p. 31 (*Amalopenaeus elegans*, non S. I. Smith).

1925. Calman, *l. c.*, p. 6, pl. 1, figs. 3, 4 (antennal scale, petasma).

1927. Balss, *l. c.*, p. 261, figs. 16, 17.

1936. Burkenroad, *l. c.*, pp. 66 (in key), 76, 79, 80, fig. 58 (thelycum).

Antennal and infra-antennal angles acute, branchiostegal spine distinct. Distance between cervical and post-cervical grooves dorsally about $\frac{1}{4}$ distance of latter from hind margin of carapace. Apex of antennal scale symmetrical, hardly projecting beyond external spine. 4th joint of 3rd leg slightly shorter than 5th joint. Coxae of 3rd legs strongly expanded. Petasma, fig. 118, *g*. Thelycum, fig. 118, *h*.

Length up to 25 mm.

Localities.—Off Cape Point, 360 fathoms (Stebbing: *elegans*); off Cape Peninsula, 500–1014 fathoms (Calman).

Gennadas talismani Bouv.

Fig. 118, *i*, *j*.

1906. Bouvier, Bull. Mus. ocean. Monaco, no. 80, p. 10 (in key), fig. 15.

1908. *Id.*, *l. c.*, p. 28 (in key).

1914. Lenz and Strunck, *l. c.*, p. 311, pl. 18, figs. 1–14.

1936. Burkenroad, *l. c.*, pp. 66 (in key), 85, fig. 60 (thelycum).

Antennal and infra-antennal angles pointed, branchiostegal spine ?; distance between cervical and post-cervical grooves nearly $\frac{1}{2}$ distance of latter from hind margin of carapace. 4th joint of 3rd leg shorter than 5th joint. Petasma, fig. 118, *i*. Thelycum, fig. 118, *j*.

Locality.—35° 39′ S., 8° 16′ E. (Lenz and Strunck).

Distribution.—Atlantic.

Gennadas scutatus Bouv.

Fig. 118, *o*, *p*.

1908. Bouvier, *l. c.*, p. 42, pl. 8.

1925. Calman, *l. c.*, p. 4 (references, excl. Kemp, 1910, Rec. Ind. Mus., v, p. 178, subsp. *indicus*, =*propinquus* Rathbun).

1936. Burkenroad, *l. c.*, p. 83, fig. 59 (synonymy).

1938. *Id.*, *l. c.*, p. 59.

[not *scutatus indicus* Balss 1927.]

Antennal and infra-antennal angles acute, branchiostegal spine distinct. 4th joint of 3rd leg slightly shorter than 5th joint (Calman), longer than 5th joint (Bouvier). Petasma, fig. 118, *o*. Thelycum, fig. 118, *p*.

Length up to 23 mm.

Locality.—Off Cape Peninsula, 1014 fathoms (Calman).

Distribution.—N. and S. Atlantic, Indo-Pacific.

Gen. Bentheogennema Burk.

1927. Balss, D. Tiefsee Exp., xxiii (*Gennadas*, non Bate, restr. Burk.).

1936. Burkenroad, Bull. Bingham Ocean. Coll., v, p. 56.

1940. *Id.*, Ann. Mag. Nat. Hist. (xi), vi, p. 37.

Differs from *Gennadas* in having podobranchs on mxp. 3 and 1st–3rd legs; and telson with more than one pair of lateral spinules (but no median apical point).

Bentheogennema intermedia (Bate)

Fig. 119, *a*, *b*.

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 7 (*Gennadas i.*).

1936. Burkenroad, *l. c.*, p. 56, fig. 50 (references).

Rostrum with or without dorsal tooth. Distance between cervical and post-cervical grooves dorsally $\frac{1}{3}$–$\frac{1}{2}$ distance of latter from hind margin of carapace. Infra-antennal angle rounded, branchiostegal spine present or absent. Telson with 4 pairs of lateral spines. Petasma, fig. 119, *b*. Thelycum, fig. 119, *a*.

Length up to 54 mm. (Calman).

Locality.—Off Cape Peninsula, 500–1014 fathoms (Calman).

Distribution.—Atlantic, and Hawaiian Is. ? East coast of Africa and Indian Ocean.

Gen. Eusicyonia Stebb.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 25 (nom. nov. pro *Sicyonia* M. Edw. 1830, preocc.).

1934 (Dec.). Burkenroad, Bull. Amer. Mus. Nat. Hist., lxviii, pp. 116 *sqq.*

1934 (Sept.). *Id.*, Bull. Bingham Ocean. Coll., iv, pp. 70 *sqq.*

1938. *Id.*, Zoologica, xxiii, p. 80.

1939. *Id.*, Bull. Bingham. Ocean. Coll., vi, p. 57.

1943. Gurney, Proc. Zool. Soc. Lond., cxiii, B, p. 1 (larval stages) (*Sicyonia*).

Integument firm. Carapace rather deep; rostrum short, somewhat up-turned, dentate dorsally and with 1–2 teeth ventrally, continued backwards as a dentate post-rostral keel to hind margin of carapace. Hepatic spine present, sometimes also a spine on antennal angle. All abdominal segments dorsally keeled. Telson apically trifid, with 1–3 pairs of lateral mobile spinules (often minute). No scale on inner margin of basal joint of ant. 1; both flagella of ant. 1 short. Maxilla 2 with only 3 endites. Podobranch only on mxp. 2. Epipods on mxp. 1 and 2 and 1st–3rd legs. No exopods on legs. No gills on segment of 5th leg. Bunches of setae (so-called "cleansing organ") on inner apex of 5th joint and base of 6th joint of 1st leg in ♂ only. Pleopods (in adult) without endopods, except the modified 1st and 2nd appendages in ♂.

Remarks.—Burkenroad (1946, Ark. Zool., xxxvii, 2, A9, pp. 1–10) gives reasons for regarding *Sicyonia* as not being preoccupied, the Lepidopterous genus having been originally spelt, or intended to be spelt, *Sycionia*. However that may be, the similarity of the two names might become confusing, and I have retained Stebbing's name.

Key to species: see Addenda.

Eusicyonia longicauda (Rathbun)

Fig. 119, *c–f.*

1914. Stebbing, *l. c.*, p. 26, pl. 9 (Crust., pl. 73).

? *E. fallax* de Man 1907.

Integument finely pilose. Carapace with 2 post-rostral teeth behind level of hepatic spine, antennal angle unarmed; rostrum reaching to or

nearly to end of peduncle of ant. 1, with 3 dorsal teeth, apex bidentate, the actual apex projecting beyond the ventral tooth. Posterior angles of bifurcate dorsal keels on abdominal segments 1–5 quadrate, not produced into spines or sharp points, keel on segment 6 ending in a sharp point, no notch or emargination in keel on segment 2; 6th segment $1\frac{1}{2}$ times as long as 5th, its postero-inferior angle sharply

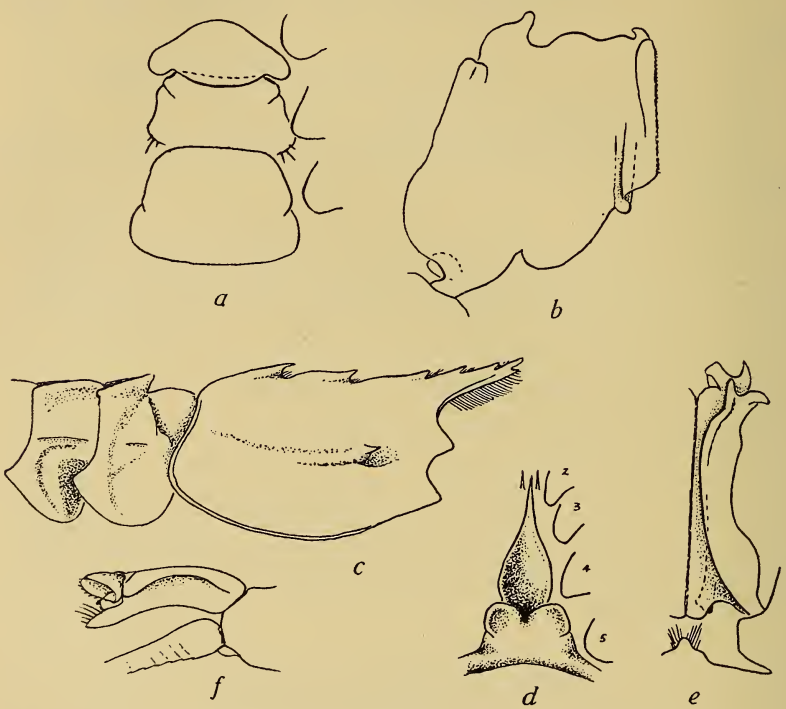


Fig. 119.—*Bentheogennema intermedia* (Bate). *a*, thelycum (after Burkenroad). *b*, posterior view of right half of petasma (after Kemp, 1909). *Eusicyonia longicauda* (Rathbun). *c*, carapace and first two abdominal segments. *d*, thelycum. *e*, posterior view of left half of petasma. *f*, pleopod 2 ♂.

pointed; ventral margins of segments rounded, without denticles; a faint horizontal lateral keel or ridge on segments 1–6 (usually only a definite keel on segments 1–3, and a low rounded ridge on segments 4–6), dorsal to which there are no vertical grooves except a faint one on segment 1, ventrally a shallow groove on each segment, a more or less triangular sunken area on segments 2–6 over which the pleurae of the preceding segments slide, becoming less conspicuous posteriorly. Telson a little longer than 6th segment, dorsally channelled between

dorso-lateral keels, on which there are 2–4 pairs of minute spinules (none on actual lateral margins). A spine on inner apex of 2nd and 3rd joints of 1st leg. Inner ramus of uropod slightly shorter than telson, outer ramus slightly shorter than inner. Petasma, outer margin evenly emarginate without deep notch, both posterior and anterior apical lobes bifurcate. Thelycum, fig. 119, *d*. Pleopod 2 ♂, appendix masculina rather stout, apically bifid, inner (median) lobe rather strongly chitinized, obliquely truncate, outer lobe thin and flexible. The antrorse sternal spine between bases of 4th legs present in both ♂ and ♀; sternite between 5th legs in ♂ simply concave; the pair of small spines between bases of 2nd legs (on either side of apex of the large antrorse spine) present in ♀ only.

Length ♀ up to 67 mm.

Localities.—Off East London, 310 fathoms (Stebbing); off Cape Morgan, 250–320 fathoms (S. Afr. Mus.).

Distribution.—Hawaiian Is. (*longicauda*). East Indies (*fallax*).

Remarks.—There are 8 specimens in the South African Museum (including 2 returned by Stebbing). The smallest is a ♂, 31 mm. in length, with fully-coupled petasma, not differing in shape from that of another ♂ of 46 mm.

Only female specimens of *longicauda* are known, and only one ♀ of the very closely allied *fallax* de Man 1907 (see Siboga Exp. monogr., xxxix*a*, p. 115, 1911, and pl. 9, fig. 38, 1913). As regards the relative lengths of the 5th and 6th abdominal segments, the present specimens are more like *fallax*. Until the ♂♂ of *longicauda* and *fallax* are discovered in their type localities, Stebbing's identification of the South African specimens may be allowed to stand.

Family SERGESTIDAE.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 80 (references).

1910. *Id.*, *l. c.*, p. 380.

1919. Hansen, Siboga Exp. monogr., xxxviii, pp. 1–65, pls. 1–5.

1922. *Id.*, Res. Sci. Camp. Monaco, fasc. lxiv, pp. 1–232, pls. 1–11 (key to genera) (incl. *Luciferinae*).

1924. Gurney, "Terra Nova" Exp., zool., viii, pp. 77 *sqq.* (larval stages).

Carapace moderately compressed, rostrum shorter than eye-stalks, small, sometimes rudimentary. Lower flagellum of ant. 1 ♂ modified as a prehensile organ. Flagellum of ant. 2 elongate, with a kink or bend, beyond (distal to) which the joints are setose. Mxp. 1 with

well-developed epipod and exopod. Mxp. 3 and all legs without epipods. Mxp. 2 and 3 and all legs without exopods. Gills reduced, no arthrobranchs. Petasma always symmetrical. No thelycum, but sternite between 3rd legs, sometimes also 4th legs, and the coxae of 3rd legs in ♀ modified. Pleopod 2 ♂ with unilamellate appendix masculina (Bate's pl. 69 is incorrect in showing two lobes).

Remarks.—Atlantic, Indo-Pacific, more numerous in tropical waters.

Key to South African genera: see Addenda.

Gen. Sergestes M. Edw.

1905. Stebbing, *l. c.*, p. 80 (references).
1919. Hansen, *l. c.*, pp. 2 *sqq.* (key to some of the species).
1922. *Id.*, *l. c.*, pp. 11 *sqq.* (key to N. Atlantic species).
1935. Gordon, J. Linn. Soc. Lond., xxxix, p. 308 (photophores).
1939. *Id.*, Ann. Mag. Nat. Hist. (xi), 4, p. 498.
1940. Burkenroad, Ann. Mag. Nat. Hist. (xi), 6, p. 38.

First 3 pairs of legs elongate, slender, with stiff outstanding bristles; 1st leg without proper chela; 3rd leg with very small chela (non-chelate in *pectinatus*); 4th–6th legs 6-jointed, the dactyls being absent, 5th much shorter than 4th, one or the other natatory. Mx. 1 with palp; mx. 2 with 2 lobes; mxp. 1 with segmented palp. Branchial lamellae as well as pleurobranchs; 2 pleurobranchs on 4th leg. Petasma with the processus ventralis not forked (fig. 120, *c*, *f*, *j*).

Remarks.—The carapace is thin, and the gills usually show through in the branchial region. The petasma is complicated, and forms the best specific character. As Hansen says, each part of it should be mentioned in the specific diagnosis; and a general view of the petasma *in situ* or without details is more misleading than useful.

Luminous organs have been found in several species, but their presence is not easy to determine unless fresh material is available.

Larval stages. The first stage is the *Protozoea*, followed by the *Zoea* (*Elaphocaris*), Schizopod (*Acanthosoma*), and *Mastigopus* stages. The *Mastigopus* stage is characterized by the temporary disappearance of the last two pairs of legs, which reappear in the adult.

Key to the South African Species (*adapted from Hansen*).

1. Mxp. 3 about the same length as 3rd leg. Middle part and processus uncifer of the petasma long (fig. 120, *c*, *f*, *i*, *l*). Outer ramus of uropod setose for less than half its length.

A. Supra-orbital and hepatic spines well developed (fig. 120, *a*). 3rd joint of peduncle of ant. 1 slender in both sexes. 5th leg with natatory setae on only one margin of the two distal joints . . . *arcticus.*

B. Supra-orbital spine absent (fig. 120, *e*, *h*, *k*). 3rd joint of peduncle of ant. 1 stout. Natatory setae on both margins of distal joints of 5th leg.

1. Denticle on antennal scale not projecting beyond apical margin. Two blunt lobes on 3rd coxa ♀ (fig. 120, *g*). Lobus armatus on petasma very long (fig. 120, *f*) . . . . *phorcus.*

2. Denticle on antennal scale projecting beyond apical margin.

a. No lobus inermis on petasma (fig. 120, *l*). No teeth or lobes on 3rd coxa ♀. No luminous organs . . . . *splendens.*

b. Lobus inermis present (fig. 120, *j*). Two sharp teeth on 3rd coxa ♀. Luminous organs present . . . . . *gloriosus.*

II. Mxp. 3 much longer and stouter than 3rd leg. Middle part of petasma short and broad, processus uncifer almost rudimentary (fig. 120, *o*, *p*). Outer ramus of uropod setose for at least half its length . . . . *armatus.*

Sergestes arcticus Kröyer

Fig. 120, *a–d*.

1910. Stebbing, *l. c.*, p. 381.

1922. Hansen, *l. c.*, p. 62, pl. 1, figs. 1, 2 (coloured), pl. 3, figs. 3–5, pl. 4, figs. 1, 2 (references).

1925. *Id.* in Calman, Fish. Mar. Biol. Surv. Rep., iv, Spec. Rep. 3, p. 23.

Rostrum short, horizontal, acute; supra-orbital and hepatic spines distinct. Eyes obconic, cornea wider than stalk, no protuberance on latter. Telson with one lateral denticle distally, and 3 on the sub-rounded apex. Petasma, fig. 120, *c*; ventral process long, distally with more or less reflexed and spiniform projections; lobus armatus long, curved; connecting lobe stout, triangular; terminal lobe with 2 apical "crochets"; no lobus inermis. Hind margin of 2nd sternite ♀ convex and bulbous; coxa of 3rd leg ♀ with 2 somewhat unciform teeth.

Length ♀ up to 65 mm. (Kemp), ♂ smaller. Transparent, stomach blackish, other internal organs reddish, red dots on abdominal segments.



FIG. 120.—*Sergestes arcticus* Kröyer. *a*, carapace. *b*, lower flagellum of ant. 1 ♂. *c*, posterior view of left half of petasma. *d*, anterior view of left pleopod 2 ♂. *Sergestes phorcus* Faxon. *e*, rostrum. *f*, petasma. *g*, sternites of ♀ (*m* = membranous fold guarding genital openings). *Sergestes gloriosus* Stebb. *h*, rostrum. *i*, posterior view of left half of petasma. *j*, anterior view of apex further enlarged. *Sergestes splendens* Sund. *k*, rostrum. *l*, one-half of petasma, with apex further enlarged. *Sergestes armatus* Kröyer. *m*, rostrum. *n*, lower flagellum of ant. 1 ♂. *o*, one-half of petasma. *p*, apex further enlarged. (*k*–*p* after Hansen, 1922.)

(*lam.*, external lamina. *l.a.*, lobus armatus. *l.b.*, lobus basalis. *l.c.*, lobus connectens. *l.i.*, lobus inermis. *l.t.*, lobus terminalis. *med.*, middle part. *p.unc.*, processus uncifer. *p.v.*, processus ventralis.)

Localities.—Off Table Bay, 300 fathoms (Stebbing); N.W. of Table Bay, 500 and 900 fathoms (Hansen); off Cape Point, 310 fathoms (S. Afr. Mus.).

Distribution.—N. and S. Atlantic, Mediterranean, S. Australia.

Sergestes phorcus Faxon

Fig. 120, *e–g*.

1893. Faxon, Bull. Mus. Comp. Zool. Harv., xxiv, p. 217.

1895. *Id.*, Mem. Mus. Comp. Zool. Harv., xviii, p. 210, pl. 52 (*bisulcatus*, non Wood-Mason).

1905. Stebbing, *l. c.*, p. 87, pl. 24, fig. A (*bisulcatus*, non Wood-Mason).

1910. *Id.*, *l. c.*, p. 381 (*bisulcatus*, non Wood-Mason).

1919. Hansen, *l. c.*, p. 5.

1922. *Id.*, *l. c.*, pp. 92, 97 (references to *bisulcatus* Stebb. and *phorcus*).

? 1925. *Id.* in Calman, *l. c.*, p. 23 (*grandis*, non Sund).

Rostrum obliquely upstanding, oblong, apex acute, a small denticle on upper margin; supra-orbital spine absent, a small blunt knob in place of the hepatic spine. Eyes obconic, cornea wider than stalk, no protuberance on latter. Telson apically pointed, with 1–3 minute and inconspicuous pairs of lateral spinules distally. Petasma, fig. 120, *f*; ventral process lanceolate; lobus armatus very long, apex curving inwards, with 3–4 "crochets"; lobus connectens and terminalis both bifid, the anterior portion broader and more triangular in shape; lobus inermis projecting beyond lobus terminalis. Hind margin of 2nd sternite ♀ convex and bulbous, coxa of 3rd leg ♀ with 2 large blunt lobes. Lower flagellum of ant. 1 ♂ as in *arcticus* (*cf.* fig. 120, *b*).

Length ♀ up to 86 mm., ♂ 75 mm. Red (Stebbing).

Localities.—Off Cape Point, 250–300 fathoms (Stebbing); N.W. of Table Bay, 270–1500 fathoms (Hansen); off Natal coast, 820 fathoms (Hansen); off Cape Point and south of Agulhas Bank, 360–560 fathoms (S. Afr. Mus.).

Distribution.—Eastern Pacific.

Remarks.—In 1919 Hansen considered that Stebbing's specimen might well be *phorcus*, but in 1922 he decided that it was more likely to be the Atlantic species *grandis*, which Sund had shown to be different from *phorcus*. In 1925 Hansen records *grandis* but, like Stebbing, he had no male. Two males in the South African Museum from the

same haul as Stebbing's ♀ show that the Cape form is most closely allied to *phorcus*, if not identical with it. Hansen (1922, p. 97) has detailed the differences between *grandis* and *phorcus*, but without figuring the petasma of the latter for comparison. The most noteworthy feature of the petasma of *phorcus* seems to be the enormous lobus armatus.

Sergestes splendens Sund

Fig. 120, *k*, *l*.

1920. Sund, Rep. "Michael Sars" Exp., iii, pt. 2, p. 14, figs. 16–21.
1922. Hansen, *l. c.*, p. 98, pl. 5, fig. 4, *a–l* (*crassus* nom. nov.).
1925. *Id.* in Calman, *l. c.*, p. 23 (*crassus*).

Rostrum ovate, apex acute; supra-orbital spine absent, hepatic spine represented by a rounded knob. Eyes obconic, cornea wider than stalk, latter with a protuberance on inner surface near cornea. Telson apically acute, lateral spinules minute or absent. Petasma, fig. 120, *l*; lobus inermis absent. 3rd coxa ♀ without teeth or lobes. Lower flagellum of ant. 1 ♂ similar to that of *arcticus*.

Length ♀ up to 39 mm. (Sund), ♂ 37 mm. (Hansen).

Locality.—Off Table Bay, 900 and 1014 fathoms (Hansen).

Distribution.—N. Atlantic, and Monaco area (not the Mediterranean as a whole).

Remarks.—Hansen in 1919 merely gave the name "splendens" to a species collected by the "Talisman," without description as he himself stated in 1920. It is therefore a *nom. nud.* Sund's species *splendens* was published on 30th March 1920, whereas Hansen's full description of the "Talisman" *splendens* was later than 24th June 1920 (Bull. Mus. d'Hist. Nat., 1920, no. 6, contains papers presented at the meeting on that date; see no. 7, p. 597). Therefore Sund's *splendens* is a valid name, Hansen's *nom. nov. crassus* 1922 is not required, Hansen's *splendens* is *nom. preocc.*, and a new name was required for the "Talisman" species: *S. talismani* Brnrd. 1947 (Ann. Mag. Nat. Hist. (xi), 13, p. 384).

Sergestes gloriosus Stebb.

Fig. 120, *h–j*.

1905. Stebbing, *l. c.*, p. 84, pls. 22, 23.
1910. *Id.*, *l. c.*, p. 381.
1925. Hansen in Calman, *l. c.*, p. 24.

Rostrum lanceolate, apex acute, a small denticle on upper margin; supra-orbital spine absent, hepatic spine represented by a blunt knob. Eyes obconic, cornea wider than stalk, latter without protuberance. Telson apically acute. Petasma, fig. 120, *i*, *j*, apparently more strongly chitinized than in other species, distal portion of the middle part forming a rigid sheath along the bases of the processus ventralis and lobus armatus, its outer edges (on anterior and on posterior surface) projecting freely like a knife-edge; lobus armatus bilobed, the lobes curving towards one another; lobus inermis also bilobed, the inner (towards median line of animal) lobe lanceolate, the outer rounded-quadrangular, hidden in posterior view by the lobus terminalis. 3rd coxa of ♀ with 2 sharp curved teeth. Lower flagellum of ant. 1 ♂ as in *arcticus* (not well shown in Stebbing's figure).

Length up to 50 mm.

Localities.—Off Sandy Point (N. of Gt. Kei River), 800 (*sic*; log-book says 500?) fathoms (Stebbing); off Durban, 260 fathoms (Hansen); off Gt. Kei River, Bashee River, and East London, 250–300 fathoms (S. Afr. Mus.).

Remarks.—The luminous organs are not very easy to detect in long-preserved and faded specimens. According to Stebbing and Hansen there are 7–8 on inner surface of carapace at the upper border of the branchial cavity, 18 near lower border of carapace; others on the last 3 thoracic and first 5 abdominal sternites, peduncle of antenna 1 and antennal scale, mouth-appendages and legs, peduncles of pleopods, 6th abdominal segment, uropods, and one on underside of eye-stalk.

The numbers of luminous organs along lower margin of carapace and on antennal scale are greater than in any other species (*challengeri* Hansen 1903, *fulgens* Hansen 1919, "splendens" Hansen 1920 *).

Sergestes armatus Kröyer

Fig. 120, *m–p*.

1922. Hansen, *l. c.*, p. 174, pl. 10, fig. 6, *a–k*.

1925. *Id.* in Calman, *l. c.*, p. 26.

Rostrum apically acute, with denticle on upper margin; supra-orbital and hepatic spines small. Eyes slightly obconic, cornea wider than stalk, latter with protuberance on inner margin. Telson apically rounded, with a pair of minute apical spinules. Petasma, fig. 120, *o*, *p*, middle part short and broad, processus uncifer very

* See remarks under *splendens* Sund.

small, lobus connectens subglobular. 3rd coxa ♀ with a well-developed process.

Length ♀ up to 47 mm., ♂ 35 mm.

Locality.—N.W. of Table Bay, 755 fathoms (Hansen).

Distribution.—N. and S. Atlantic.

Remarks.—The long and robust 3rd maxilliped distinguishes this species at a glance from the other South African species.

Family LEUCIFERIDAE.*

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 27 (*Leuciferidae*).

1919. Hansen, Siboga Exp. monogr., xxxviii, p. 48 (*Luciferinae*).

1922. *Id.*, Res. Sci. Camp. Monaco, fasc. lxiv, pp. 10, 198 (*Luciferinae*).

Carapace strongly compressed, anteriorly elongated so that the mandibles are widely separated from the antennae and eyes; rostrum short, acute. Antenna 1 without lower flagellum in both sexes. Mxp. 1 without epipod and exopod; mxp. 2 without epipod. Only the 1st–3rd pairs of legs present, and only the 3rd pair chelate (imperfectly). Sixth abdominal segment with 2 ventral processes in ♂. Telson in ♂ with strong ventral protuberance. Genital openings in both sexes single (unpaired). Petasma sessile, symmetrical. Appendix masculina on pleopod 2 ♂ unilamellate.

Remarks.—Only one genus. Pelagic. The only Decapod Crustacean without gills.

Gen. Leucifer M. Edw.*

1882. Brooks, Philos. Trans. Roy. Soc., clxxiii, p. 57 (*Lucifer*).

1909. Calman in Lankester's Treatise Zool., vii, pp. 295–297, figs. 172–174, and p. 311 (*Leucifer*).

1914. Stebbing, *l. c.*, p. 27 (*Leucifer*).

1915. Borradaile, Ann. Mag. Nat. Hist. (8), xvi, p. 226 (*Lucifer*).

1915. Kemp, Mem. Ind. Mus., v, p. 322 (*Lucifer*).

1919. Hansen, *l. c.*, p. 48 (key to species) (*Lucifer*).

* Stebbing (1893, Hist. Crust., p. 221, and *l. c.*, *supra*, p. 27) claims that *Lucifer* V–T. is preoccupied by Linné 1760. But Sherborne says *Lucifer* Linn. "non gen. sed triv. est." The Prussian Academy Nomenclator gives "*Lucifer* Linn. 1763. non bin." Neave's Nomenclator does not mention *Lucifer* Linn.

Stebbing gives date of Vaughan-Thompson's name as 1829, Sherborne as January 1830, Neave also as 1830.

1922. Hansen, *l. c.*, p. 198 (*Lucifer*).

1927. Gurney, Trans. Zool. Soc. Lond., p. 246 (development).

Remarks.—Hansen (1919) admits only 6 species, divided into two groups according as the eyes are long (about as long as the "neck" of the carapace) or short (about half the length of the "neck").

The first larval stage is the *Metanauplius*, which is followed by the *Protozoea*, *Zoea*, Schizopod, and *Mastigopus* stages (Calman, *l. c.*, figs. 172–174). As regards the absence of the 4th and 5th legs, *Leucifer* represents a permanent *Mastigopus*-form (Calman).

Leucifer penicillifer Hansen

Fig. 121.

1914. Stebbing, *l. c.*, p. 28 (*typus*, non M. Edw., Hansen).

1919. Hansen, *l. c.*, p. 59, pl. 5, fig. 2, *a–k*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 384.

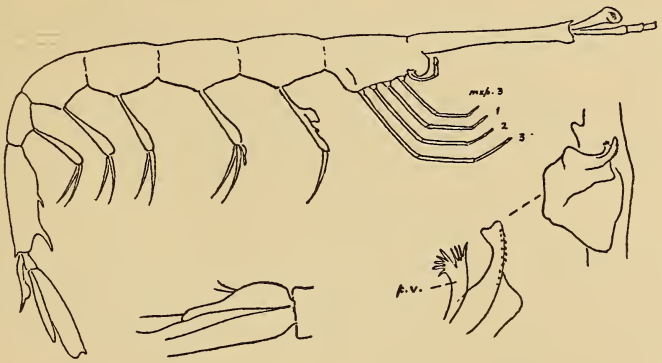


Fig. 121.—*Leucifer penicillifer* Hansen. Outline of ♂; petasma, with chitinized portion and processus ventralis further enlarged; appendix masculina on pleopod 2 ♂.

Length of "neck" twice or slightly more than twice length of eyes (stalk plus cornea). 1st peduncular joint of ant. 1 extending to or very slightly beyond end of cornea. On 6th abdominal segment ♂ the 2nd process is longer than the 1st, tapering to a narrow subacute apex. Outer ramus of uropod with marginal tooth not or scarcely reaching apex. Petasma: chitinized portion curved, apically expanded, inner margin scabrous; processus ventralis widening distally, with a bipartite apical brush of spiniform projections; protuberance on peduncle (distal to petasma) bluntly digitiform.

Length ♂ up to 9·5–10 mm., ♀ 10·8 mm.

Locality.—Mossel Bay, surface (Stebbing, and S. Afr. Mus.).

Distribution.—East Indies, Bay of Bengal, Philippine Is., China Sea, Gulf of Yeddo (Hansen).

Remarks.—Stebbing's record was published before Hansen had shown that the species could be easily distinguished by the petasma. In this species the apically spinose processus ventralis is distinctive.

It seems curious that specimens of this Crustacean were captured on only one occasion by the s.s. *Pieter Faure* (9th February 1904).

CARIDEA.

1907. Borradaile, Ann. Mag. Nat. Hist. (7), xix, p. 470 (*Carides*).

1909. Calman, Lankester's Treat. Zool., vii, p. 311.

1910. Stebbing, *l. c.*, p. 381.

1924. Gurney, "Terra Nova" Exp. Rep., zool., viii, pp. 103 *sqq.* (larval stages).

1939. Burkenroad, Ann. Mag. Nat. Hist. (xi), 3, p. 310 (superfamilies).

Abdomen generally with a sharp bend at the 3rd segment (figs. 128, 131, 147). Pleurae of 2nd segment overlapping those of 1st segment (figs. 128, 131, 147, 150). Ant. 1 usually with stylocerite. Mandibular palp, if present, straight. Mxp. 1 with lobe at base of exopod, endopod short; mxp. 2 usually with last joint attached like a strip to the margin of penultimate joint, but see key and fig. 122, *a–c*; mxp. 3 with 4–6 joints. Third pair of legs never chelate. First pair of pleopods ♂ without petasma. Gills phyllobranchiate. Eggs carried by ♀ attached to the pleopods.

Remarks.—Borradaile grouped the families into seven superfamilies, but Kemp (1910, Fish. Irel. Sci. Invest. [1908], i, p. 36) considered this premature until the families themselves were more satisfactorily defined. These superfamilies (tribes) were accepted by Balss (1926–7, Kükenthal and Krumbach, Handb. Zool., iii, p. 1000). Burkenroad has suggested a re-grouping of the superfamilies. Kemp (*l. c.*, pp. 35, 36) gave a key to 10 N. Atlantic families. The South African fauna includes representatives of 14 out of the 16 families recognized by Borradaile (excl. *Autonomaeidae*) and Calman.

The family *Campylonotidae* (Sollaud 1913) has been included in the Oplophoroid series. *Campylonotus capensis* Bate 1888, off Marion Is. and Pernambuco, can scarcely be reckoned in the South African fauna in spite of its specific name.

Key to the South African Families (adapted from Borradaile and Kemp).

I. Mxp. 2 with 7th joint attached terminally to 6th, exopod rudimentary or absent (fig. 122, *a*). First 2 pairs of legs longer and stouter than the others; exopods on all legs, but no epipods. Rostrum small or absent . . *Pasiphaëidae.*

II. Mxp. 2 with 2 terminal joints attached side by side to the penultimate joint (fig. 122, *b*). Exopods absent from all legs, but epipods present on 1st–4th legs. Chelae of first 2 legs with very short palm and long fingers and thumbs. Rostrum elongate . . . . . *Stylodactylidae.*

III. Mxp. 2 with short 7th joint attached (usually) more or less laterally to 6th joint (fig. 122, *c*).

A. First 2 pairs of legs substantially similar, chelate, wrist unsegmented.

1. Finger and thumb of chelae spoon-like, ending in tufts of bristles (fig. 123, *b*, *c*, *h*, *q*). Mandible without palp. Exopods absent from some or all of the legs. Freshwater . . *Atyidae.*

2. Chelae not as in 1. Mandible with palp. Exopods on at least 4 legs. Marine.

a. Last 3 legs not abnormally long. Exopods on legs 1–5. Exopod of mxp. 1 without flagellum. Mandible imperfectly cleft (fig. 124) . . . . . *Oplophoridae.*

b. Last 3 legs abnormally long. Exopods on legs 1–4. Exopod of mxp. 1 with flagellum. Mandible deeply cleft (fig. 125, *i*) * . . . . . *Nematocarcinidae.*

B. First 2 pairs of legs more or less dissimilar. Mandible deeply cleft, or simple (figs. 125, *i* and 147, *c* resp.). Exopod on 1st leg only, or entirely absent.

1. Wrist of 2nd leg divided into 2 or more jointlets (figs. 135, *d*, 136, *i*, 141, *d*).

a. Eyes not covered by front margin of carapace.

i. 1st legs both simple or both chelate. Rostrum large, spinose or dentate.

a. 1st and 2nd legs slender, 1st simple or minutely chelate; 2nd chelae small. Mandible with distinct molar and incisor processes, and palp. Mostly deep water . *Pandalidae.*

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* Both Borradaile (1907) and Balss (1925, D. Tiefsee Exp., xx, and 1926–7, *l. c.*) place the *Nematocarcinidae* in the Hoplophoroida, with mandible indistinctly cleft!

β. 1st and 2nd legs not very slender, 1st with moderate-sized chelae. Mandible with or without incisor process, with or without palp. Mostly shallow water . *Hippolytidae.*

ii. 1st legs one simple, the other chelate. 2nd legs one much longer than the other. Rostrum short, unarmed . . . . . *Processidae.*

iii. 1st legs both subchelate. Rostrum long. Telson spiniform. Integument hard and sculptured *Glyphocrangonidae.*

b. Eyes covered by projecting frontal margin (figs. 136–144), except *Ogyrides* (fig. 135). 1st legs usually robust, chelate . *Alpheidae.*

2. Wrist of 2nd leg simple, unsegmented (fig. 146, *d*).

a. Rostrum movable (fig. 145). Epipods on legs . . . . . *Rhynchocinetidae.*

b. Rostrum immovable. No epipods on legs.

i. Mxp. 3 expanded, operculiform (figs. 146, 147) . . . . . *Gnathophyllidae.*

ii. Mxp. 3 normal.

a. 1st legs with small chelae, 2nd with larger and more robust chelae. Some species fluviatile . . . . . *Palaemonidae.*

β. 1st legs subchelate, 2nd very thin, often reduced, minutely chelate, or simple *Crangonidae.*

Family PASIPHAËIDAE.

1901. Alcock, Cat. Ind. Deep-sea Crust., p. 57.

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 293 (references and key to genera).

1920. de Man, Siboga Exp. monogr., xxxix *a*, 3, pp. 1 *sqq.* (list of species).

1924. Gurney, "Terra Nova" Exp., zool., viii, p. 111 (larval stage).

1940. Chace, Zoologica, xxv, p. 121.

Rostrum short, sometimes represented by a spine arising behind the frontal margin. Mandibular palp present or absent; molar process absent. Mxp. 2 with 7th joint attached terminally to 6th (fig. 122, *a*), exopod rudimentary or absent. First 2 pairs of legs longer and much

stouter than the others, chelae elongate, with slender fingers and thumbs, wrist short, unsegmented. Exopods on all legs, often very long; present (often very small) on mxp. 3; often forming the chief part of mxp. 1. Eggs often large, and development abbreviated.

Key to the South African Genera.

1. Mandible with slender 2-jointed palp. Telson apically truncate . . . . . *Parapasiphaë.*
2. Mandible without palp. Telson apically notched . . *Phye.*

Gen. Parapasiphaë S. I. Smith

1901. Alcock, *l. c.*, pp. 58, 64.
1914. Stebbing, Ann. S. Afr. Mus., xv, p. 32.
1940. Chace, *l. c.*, p. 126.

Rostrum normal but short; a post-orbital and post-antennal spine may be present. Mandible with slender 2-jointed palp. 4th leg shortest, 5th shorter than 3rd. Gills 11 plus 3 epipods (on mxp. 1–3). Telson apically narrow, truncate.

Parapasiphaë sulcatifrons S. I. Smith

Fig. 122, *d*.

1910. Kemp, Fish. Irel. Sci. Invest. [1908], p. 47, pl. 5, figs. 1–21.
1914. Stebbing, Ann. S. Afr. Mus., xv, p. 33.
1923. Stephensen, Dan. Oceanogr. Exp., II, D. 3, p. 40.
1925. Balss, D. Tiefsee Exp., xx, p. 236, text-fig. 10, and pl. 20.
1940. Chace, Zoologica, xxv, p. 126, fig. 6.
1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 264.

Rostrum not extending beyond eyes. Carapace carinate, strongly arched anteriorly, the anterior third sulcate to tip of rostrum; no post-orbital or (conspicuous) post-antennal spines; a lateral interrupted carina, bending downwards in front. Abdominal segments dorsally rounded, except 4th which is slightly carinate and ends in a short point. Telson dorsally sulcate, the narrow apex rounded-truncate, with 8 spines, the outermost pair the longest. Cornea of eye not wider than stalk.

Length up to 83 mm. Bright scarlet, with darker red pigment specks (Kemp).

Locality.—Off Cape Point, 660 fathoms (Stebbing).

Distribution.—N. Atlantic as far south as 32° N. lat., also 5° S., 10° E. (Balss). Balss also records a young specimen from the Indian

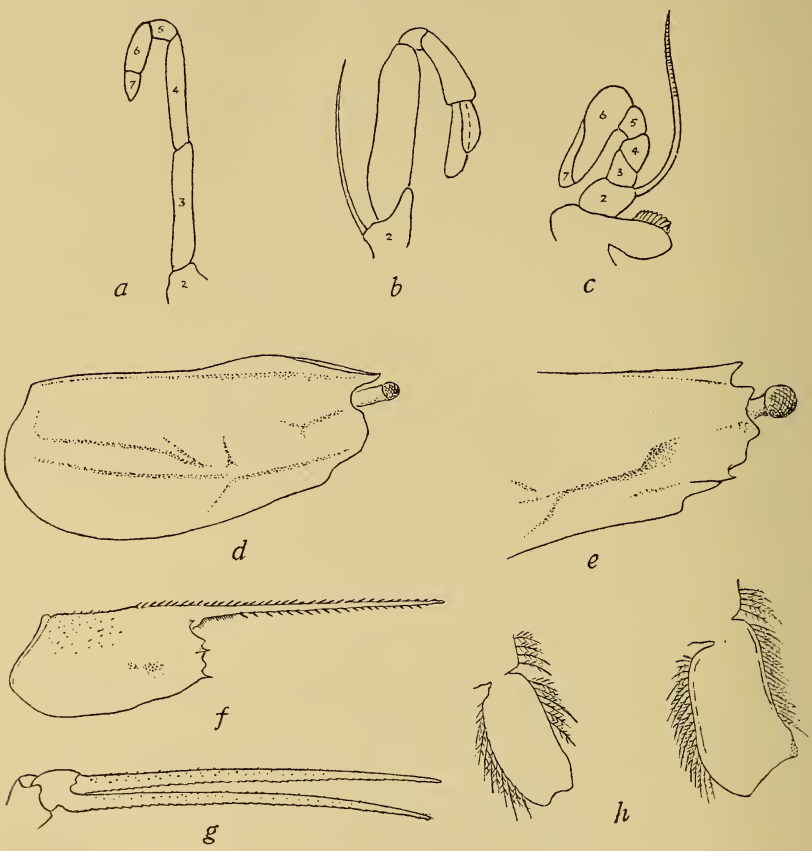


Fig. 122.—Diagrammatic figures (setae omitted) of maxilliped 2 of: *a*, *Pasiphaë*. *b*, *Stylodactylus*. *c*, *Pandalus*.
Parapasiphaë sulcatifrons S. I. Smith. *d*, carapace, showing sulcate carina.
Phye pacificus (Rathbun). *e*, carapace.
Stylodactylus bimaxillaris Bate. *f*, carapace. *g*, chela of 1st leg, plumose setae on lower margins omitted. *h*, endopod of pleopod 1 ♂ of specimens 35 mm. (left) and 58 mm. (right) in length.

Ocean, 10° S., 97° E. Hale records a specimen from 45° 53′ S., 84° 33′ E.

Remarks.—Forty specimens were caught and 20 preserved by the s.s. *Pieter Faure*, but only the one specimen, later sent to Stebbing, came to the South African Museum.

Gen. Phye Wood-Mason

1901. Alcock, *l. c.*, p. 61 (as subgen. of *Pasiphaë*).

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 294.

1920. de Man, *l. c.*, p. 5 (=*Pasiphaea*).

Rostrum a post-frontal crest or spine; a post-antennal (branchiostegal) but no post-orbital spine. Mandible without palp. Gills 8 plus a rudimentary epipod on mxp. 3. Telson apically notched. 4th leg shorter than 3rd and 5th, which are subequal, or 3rd the longer.

Phye pacificus (Rathbun)

Fig. 122, *e*.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 33.

1921. Schmitt, Univ. Calif. Publ. Zool., xxiii, p. 29, fig. 14 (*Pasiphaea p.*).

Post-frontal spine not extending as far forward as front, continued backwards as a carina nearly to end of carapace; a conspicuous post-antennal spine; a blunt lateral ridge. Abdominal segments 2–6 dorsally carinate, but without projecting points; 6th segment with a curved lateral ridge. Telson with numerous spines in the deep apical notch. Cornea of eye wider than stalk.

Length up to 103 mm. Deep red (s.s. *Pieter Faure* log-book).

Locality.—Off Durban, 440 fathoms (Stebbing).

Distribution.—Alaska to Gulf of California.

Remarks.—Seven specimens were caught and preserved, but only one was in the *Pieter Faure* collection when handed over to the South African Museum.

Family STYLODACTYLIDAE.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 49.

1925. Kemp, Rec. Ind. Mus., xxvii, p. 256.

Rostrum elongate, serrate dorsally and (usually) also ventrally. Mandible with 2-jointed palp, molar and incisor processes not clearly separated. Mxp. 2 with two terminal joints attached side by side to apex of penultimate joint (fig. 122, *b*). Exopods absent from all legs, but epipods present on 1st–4th legs. Legs moderately long, subequal, slender; wrist of first 2 pairs unsegmented, chelae elongate, fingers and thumbs slender, contiguous, palm very short. Telson acute.

Remarks.—A single genus. For comments on the interpretation of the joints of mxp. 2 see Stebbing. Bate's figure of the telson is deceptive.

Gen. Stylodactylus M. Edw.

1914. Stebbing, *l. c.*, p. 50.
1920. de Man, Siboga Exp. monogr., xxxix *a*, 3, p. 31 (list of species).
1925. Kemp, *l. c.*, p. 256 (key to species).

Stylodactylus bimaxillaris Bate.

Fig. 122, *f–h*.

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 855, pl. 138, fig. 3.
1914. Stebbing, *l. c.*, p. 51, pl. 12 (Crust., pl. 76) (*serratus*, non M. Edw.).
1925. Kemp, *l. c.*, pp. 257 (in key), 258.
1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 16.
1939. *Id.*, John Murray Exp., vi, p. 188.

Rostrum longer than rest of carapace, 37–40 spines on dorsal margin, 19–23 (in one case 25) on ventral margin. Carapace not carinate, sparsely setose posteriorly, hind margin costate; small post-orbital, post-antennular and post-antennal (branchiostegal) spines; cervical groove obsolete. Antennal scale nearly as long as carapace (excl. rostrum), its outer margin entire (except for the apical spine). Abdominal segments dorsally rounded, segment 3 longer than the others, distincly humped and produced over base of 4th; inferior margins entire, postero-inferior angle of segments 4–6 with a small sharp point. Telson with 5 pairs of dorsal spines in front of the apical spines.

Length ♂ up to 58 mm., ♀ 77 mm.; smallest ovig. ♀ in S. Afr. Mus. 48 mm. Whitish, with orange-coloured eggs (s.s. *Pieter Faure* log-book).

Localities.—Off East London, 300 fathoms (Stebbing, and S. Afr. Mus.); off Cape Morgan (S. Afr. Mus.); off Cape Peninsula, 755 fathoms (Calman) and 190 fathoms (S. Afr. Mus.).

Distribution.—Admiralty Is. and Japan.

Remarks.—Although the s.s. *Pieter Faure* log-book records that many were caught at one station off the Cape Peninsula and 12 preserved, only 2 of these are now available; from the other localities, however, there are 11 ovig. ♀♀ (April), 1 juv. ♀, and 1 juv. ♂.

Family ATYIDAE.

1910. Stebbing, *l. c.*, p. 393.

1912. Kemp, Rec. Ind. Mus., vii, pp. 113 *sqq.* (deals chiefly with *Xiphocaridina*).

1924. Gautier, Bull. Soc. Hist. Nat. Afr. Nord., xv, pp. 337 *sqq.*, pls. (development, *Atyaëphyra*).

* 1925. Bouvier, Atyides. Encycl. Entomol., iv, pp. 1–370, 716 text-figs.

1926. J. Roux, Rec. Austral. Mus., xv, p. 237 (Australian forms).

1927. Gurney, Trans. Zool. Soc. Lond., p. 252 (development, *Caridina*).

1928. Calman, Proc. Zool. Soc. Lond., p. 737 (Tanganyika forms).

1929. J. Roux, Faune Col. Franç., iii, p. 293.

1931. *Id.*, Rev. Suisse Zool., xxxviii, pp. 34, 63 (Indian forms).

1938. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiii, p. 67 (Japanese forms).

Rostrum well developed. Last 2 peduncular joints of ant. 1 at least as long as broad. Mandible without palp, molar and incisor processes not separated by a cleft. Exopod of mxp. 1 produced inwards at apex, epipod reduced. Mxp. 2 with 7th joint larger than, and attached laterally to, 6th joint (except in *Xiphocaris*). 1st and 2nd legs subequal, chelate, wrist unsegmented, finger and thumb with apical brush of setae (except in *Xiphocaris*). Abdominal hump well marked, or obsolete. Telson truncate, without apical median point. Exopods on all legs, or absent from some, or all. Epipods at most on 1st–4th legs, sometimes only on 1st leg. Arthrobranchs on 1st leg, but absent from the others (except in *Xiphocaris*). Gills 12 (*Xiphocaris*), or 9, or fewer.

Remarks.—All the members of this family inhabit fresh water, and are found all over the world except in the polar regions, but chiefly in the tropical and subtropical zones.

Development in many cases abbreviated.

Only one genus in South Africa.

Key to the African Series and Genera.

Chelae with brushes of setae. Gills at most 9 (typical Atyids).

I. Supra-orbital spines present. Exopods at least on 1st and 2nd legs. *Paratya* series, represented in Africa by one genus (*Dugastella*) in Morocco.

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* 1925 on title-page. Publisher's advertisement facing title-page (inside cover) gives 1924.

II. No supra-orbital spines. No exopods on legs.
A. No arthrobranchs on legs. Gills 8, 5, or 4. *Caridella* series, represented by 5 genera in the Great Lakes and Upper Nile.
B. One arthrobranch on 1st leg. Gills 9 (in African genera). *Caridina* series.
1. Chelae not cleft to base (fig. 123, *b*, *c*, *h*).
a. Wrist of 2nd leg not excavate, of 1st leg usually excavate but not always (fig. 123, *b*, *c*) . . . . . *Caridina*.
b. Wrist of both 1st and 2nd legs excavate . . . [*Ortmannia*, Mauritius, West Africa, etc.].
2. Chelae cleft to base (fig. 123, *q*) . . . . [*Atya*, Mauritius, etc., West Africa, and extra African].

Gen. Caridina M. Edw.

1898. Hilgendorf, Deutsch Ostafr., iv, Decap. Crust., p. 34.
1908. de Man, Rec. Ind. Mus., ii, pp. 255 *sqq*.
1910. Stebbing, *l. c.*, p. 393.
1925. Bouvier, *l. c.*, p. 124.
1925. de Man, Ann. Mus. Congo, ser. 3, sect. 3, fasc. 1. [Not seen by me.]
1930. Gordon, Proc. Zool. Soc. Lond., p. 33.
1933. Id., J. Linn. Soc. Lond., xxxviii, p. 351 (East African Lakes).
1938. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiii, p. 82.

Rostrum smooth or serrate. No supra-orbital spines; antennal spine present, near to or fused with the infra-orbital angle. Wrist of 1st leg usually, of 2nd leg never, excavate; fingers and thumbs of both pairs terminated by a single stylet or unguis, and brushes of setae which are shorter than the fingers. No exopods on legs. Arthrobranch on 1st leg. Epipods on some or all of 1st–4th legs. Gills 9.

Remarks.—Variation and plasticity are so great that it is very difficult to define any species with exactitude. Bouvier's keys to the *varieties* of a species often employ the same characters as are used in the key to the "*species*" (*cf.* A and A′, pp. 145, 146, with C and C′, pp. 136, 137. Also the eggs of *nilotica* var. *paucipara*, p. 145, are approximately of the same dimensions as those of *africana*, p. 137). The present taxonomy, in fact, seems to suffer from almost too much "finesse." As Dr. Gordon said (*l. c.*, 1930, p. 33): "Previous workers have generally found that each new collection differed somewhat from

most or all previously described forms, and in many cases definite subspecific or varietal names have been given." Dr. Gordon therefore very rightly endeavoured to show the *extent of variation* of certain structures (rostrum, etc.) in collections from different parts of Africa. The detailed examination of a large amount of material from very many localities in one region, *e.g.* Natal–Zululand, if carried out *taking no account of so-called varieties*, should lead to useful and important results.*

Moreover, collecting should be done not merely intensively, but with a set purpose; casual collecting of a few specimens here and there is not very helpful.

The growth-changes in a colony at any one locality in South Africa have not yet been studied (*cf.* Gurney, 1927).

With the material at hand I have not undertaken any detailed examination, merely separating the three well-marked forms: *typus*, *nilotica* var. with large eggs, and a longirostrate form from the Zambesi River.

Key to the South African Species and Varieties.

1. Wrist of 1st leg deeply excavate (fig. 123, *b*); whole upper margin of rostrum smooth . . . . . *typus.*
2. Wrist of 1st leg not deeply excavate (fig. 123, *h*).
   - *a*. Apical portion of rostrum dorsally smooth; rostrum as long as or a little longer than carapace.
     - i. Eggs medium sized: ·7–·86 mm. major axis . *nilotica.*
     - ii. Eggs small: ·42–·46 mm. major axis . . . var. *natalensis.*
     - iii. Eggs large: ·9–1·3 mm. major axis . . . var. *paucipara.*
   - *b*. Dorsal margin of rostrum dentate almost to apex.
     - i. Rostrum much longer (1½ times) than carapace, with *ca.* 40 dorsal teeth . . . . ? *indistincta.*
     - ii. Rostrum shorter than carapace, with not more than 26 dorsal teeth. Telsonic spines, fig. 123, *n* . . . . . *africana.*

For Mauritian species and varieties see Bouvier, *l. c.*, 1925.

Caridina typus M. Edw.

Fig. 123, *a–d*.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 363, pl. 25 *bis*, figs. 4, 5.

1897. Weber and de Meijere, Zool. Jahrb., x, p. 167.

* See also Woltereck, "Untersuchungen an Atyiden von Belgisch Kongo," Rev. Zool. Bot. Afric., xxxvi, 1942, pp. 229 *sqq.*

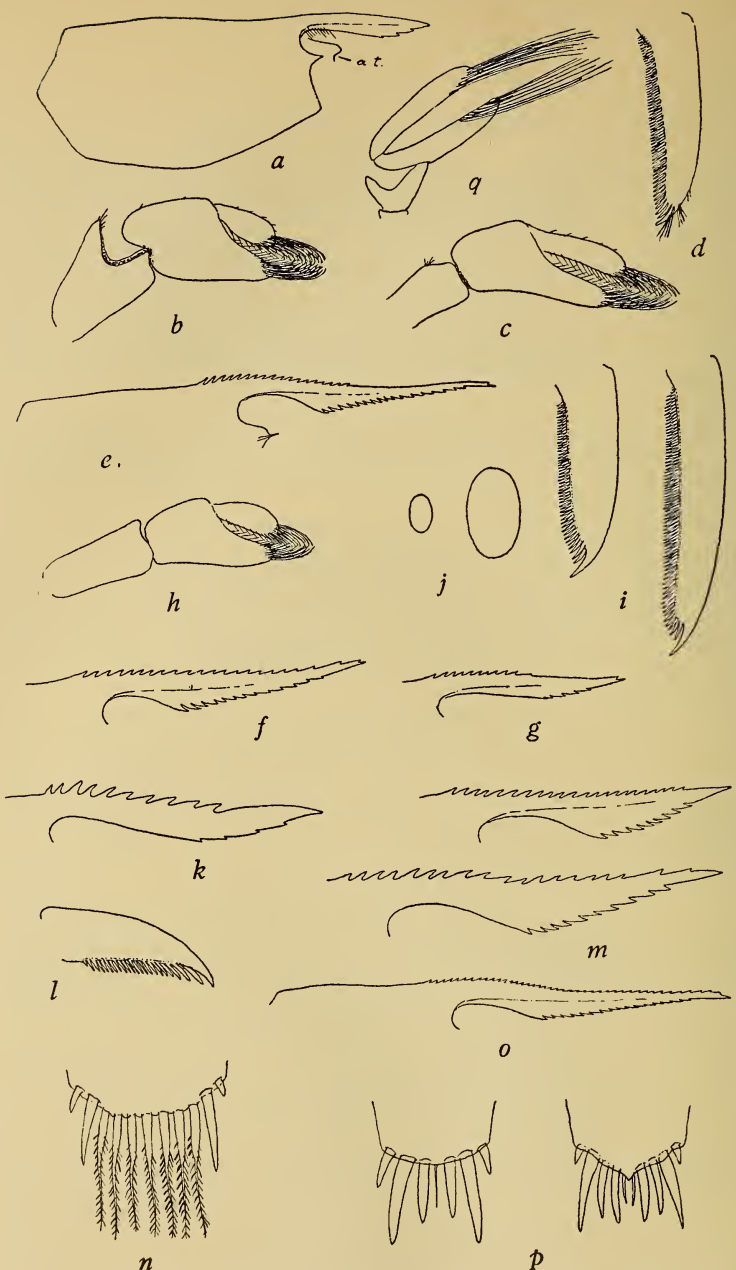


Fig. 123.—*Caridina typus* M. Edw. *a*, carapace (*a.t.*, antennular tubercle). *b*, wrist and chela of 1st leg (♀). *c*, the same, 2nd leg (♀). *d*, dactyl of 5th leg. *Caridina nilotica* (P. Roux). *e*, rostrum of specimen from Uvongo River. *f*, rostrum of abnormal specimen from Vaal River at Warrenton. *g*, rostrum of juv. 8 mm. long from Zoutpansberg. *h*, wrist and chela, 1st leg. *i*, dactyls of 5th leg of var. *natalensis* (left) and var. *paucipara* (right) (after de Man). *j*, eggs of var. *natalensis* (left) and var. *paucipara* (right) (after de Man). *Caridina* "*africana*" de Man 1897 (? non Kingsley). *k*, *l*, rostrum and dactyl of 5th leg (after de Man). *Caridina africana* Kingsley. *m*, rostra (above, after Bouvier; below, after Gordon). *n*, apex of telson (after Bouvier and Gordon). *Caridina* ? *indistincta* Calman. Zambesi River. *o*, rostrum. *p*, apex of telson, left 1 specimen, right 2 specimens. *Atya serrata* Bate. *q*, wrist and chela, 1st leg.

1898. Hilgendorf, *l. c.*, p. 34.

1910. Stebbing, *l. c.*, p. 394 (in note on *nilotica*).

1925. Bouvier, *l. c.*, p. 249, figs. 271–297 (on pp. 126, 127).

1926. J. Roux, Rec. Austral. Mus., xv, p. 246.

1938. Kubo, *l. c.*, p. 83, figs. 13, 14.

Rostrum shorter than carapace, reaching to middle or end, or slightly beyond end, of 2nd peduncular joint of ant. 1, narrow lanceolate, smooth dorsally, ventrally with 1–3 (4) denticles. Infra-orbital angle not developed apart from the antennal spine. Antennular keel or tubercle (between bases of eye-stalks) prominent. Basal process of ant. 1 not reaching end of 1st peduncular joint. 1st legs shorter than mxp. 3, 5th joint (wrist) deeply excavate distally, finger not quite as long as palm. 2nd legs reaching at least as far as mxp. 3, 5th joint longer than chela, finger longer than palm. Dactyl of 5th leg nearly $\frac{1}{3}$ length of 6th joint, with 60–70 spines along margin. Lateral spines on apex of telson usually shorter than the median ones. Epipods on mxp. 3 and 1st–4th legs. Eggs small and numerous, about ·5 mm. major axis.

Length ♀ up to 41 mm.

Localities.—Natal: Umhloti, Umgeni, Illovo and Umbilo Rivers (Weber); Winkel Spruit and Uvongo River (S. Afr. Mus.).

Distribution (incl. varieties).—Mauritius, Réunion, Rodriguez, Madagascar, Zanzibar, Seychelles, East Indies, Bonin Is., New Caledonia, Queensland.

Remarks.—Ovigerous ♀♀ have been taken in March.

Caridina nilotica (P. Roux)

Fig. 123, *e–j*.

1833. P. Roux, Ann. Sci. Nat., xxviii, p. 73, pl. 7 (*Pelias n.*).

? 1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 828.

1897. Weber and de Meijere, Zool. Jahrb., x, p. 168 (*uyckii*, non Hickson, and var. *paucipara* nov.).

? 1897. de Man in Weber, *ibid.*, p. 170, pl. 15, fig. 2, *a–f* (*africana*, ? non Kingsley).

1908. de Man, *l. c.*, pp. 255, 262, 263, pl. 20, figs. 3, 4 (vars. *natalensis* nov. and *paucipara* Weber and de Meijere).

1910. Stebbing, *l. c.*, p. 394.

1912. Lenz, Ark. Zool., vii, no. 29, p. 5 (vars. *natalensis* and *paucipara*).

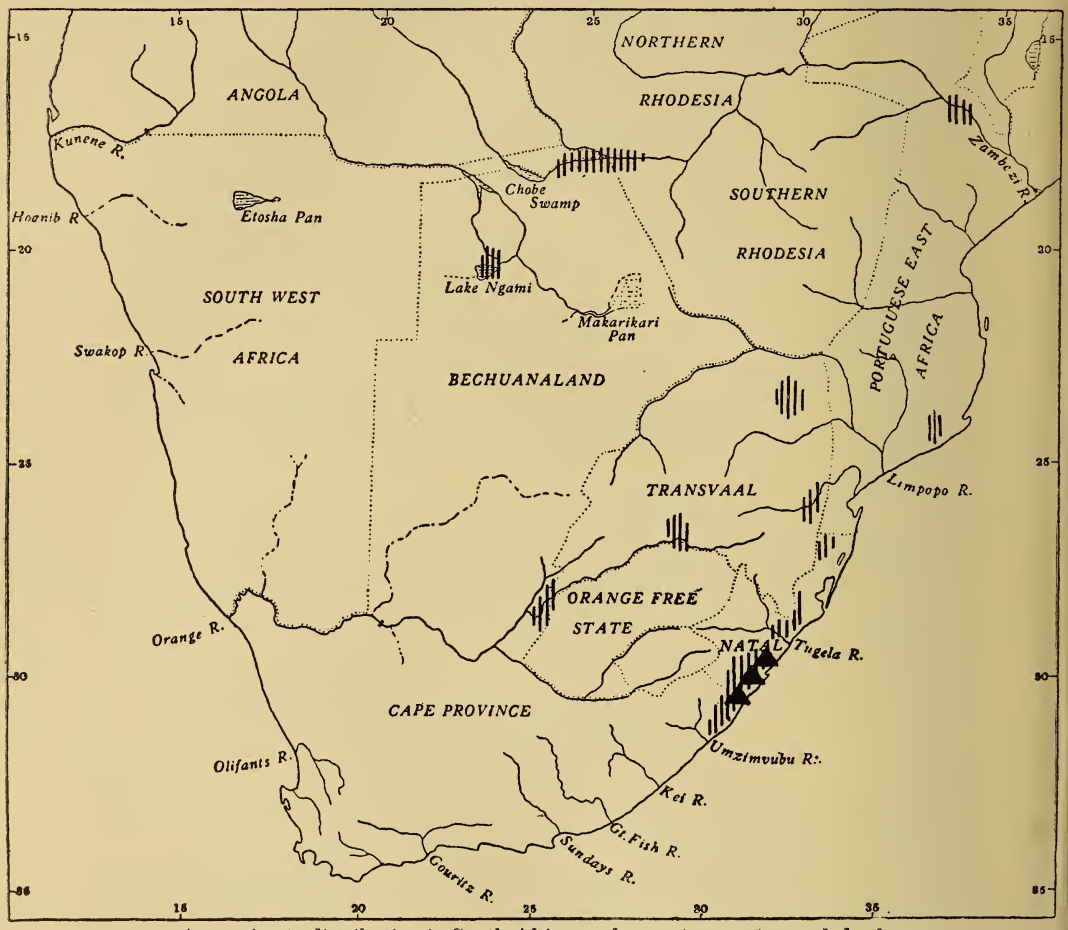
1914. Stebbing, Ann. S. Afr. Mus., xv, p. 48.

1925. Bouvier, *l. c.*, p. 143, figs. 309–331 (*not* fig. 308, =*africana*).

? 1925. *Id.*, *ibid.*, p. 214 (*africana* var. *natalensis*).

1926. J. Roux, *l. c.*, p. 246 (Australian vars.).

1927. Gurney, *l. c.*, p. 252, figs. 60–62 (larval stages).



Approximate distribution in South Africa, as far as at present recorded, of *Caridina nilotica, africana,* and varieties: |||||. *Caridina typus*: ▲.

1930. Gordon, *l. c.*, p. 33, figs. 1–5, 7–13, *b*, *c* (discussion of variable characters).

1933. *Id.*, *l. c.*, p. 351, figs. 1–3.

1933. J. Roux, Senckenbergiana, xv, p. 338.

1935. Barnard, Ann. Transv. Mus., xvi, p. 486.

1942. Woltereck, Rev. Zool. Bot. Afr., xxxvi, p. 279, figs. 12, 13 (rostra).

Rostrum as long as or a little longer than carapace, reaching at least to end of peduncle of ant. 1 and antennal scale, or beyond; ensiform, with 16–21 dorsal teeth proximally, the distal portion for a varying distance non-dentate, or with 1–2 teeth, or occasionally completely dentate, apex usually bifid, ventrally with 12–26 teeth; juveniles with fewer dorsal and ventral teeth. Infra-orbital angle well developed, curved inwards above antennal spine. No antennular tubercle. Basal process of antenna 1 not reaching apex of 1st peduncular joint. 1st leg shorter than mxp. 3, 5th joint about twice as long as wide, not excavate distally, finger subequal to palm. 2nd leg reaching at least as far as mxp. 3, 5th joint longer than chela, finger longer than palm. Dactyl of 5th leg about $\frac{1}{4}$ length of 6th joint, with 40–70 spines along margin. Telson usually with apical median point, but sometimes rounded-truncate, 3–4 spines on either side (not counting the small lateral one), the outermost one longer than the median ones. Epipods on mxp. 3 and 1st–4th legs. Eggs small, ·42–·46 mm. (var. *natalensis*), medium, ·66–·86 mm. (forma *typica*), or large, ·9–1·3 mm. (var. *paucipara*).

Length ♀ up to 30 mm., usually 25–26 mm. Semi-transparent with faint pinkish or orange-brown speckling, eyes black.

Localities.—Pondoland: Msiwanga and Xura Rivers, near Lusikisiki, and Port St. Johns (S. Afr. Mus.).

Natal: Illovo, Umgeni, Umbilo, Umhloti and Umhlasine Rivers (Weber); Amanzimtoti (Lenz); Umgeni and Greytown (Gordon); Illovo, Uvongo (south of Port Shepstone), Umbilo, Umlaas, Impolweni (S. Afr. Mus.).

Zululand (Lenz); Eshowe, Empangeni, Umhlatuzi, Pongola River (S. Afr. Mus.).

Limpopo system and Eastern Transvaal: Sabie River, and Gt. Letaba River (J. Roux); Zoutpansberg and Louis Trichardt (S. Afr. Mus.).

Lake Ngami (Gordon); Chobe River (Zambesi) (Barnard).

Orange River system: Vaal River, Kimberley (Bouvier); Vaal River, Parys (Stebbing, and S. Afr. Mus.); Vaal River at Warrenton, Mooi River at Potchefstroom, and Orange River above Aughrabies Falls (S. Afr. Mus.).

Portuguese East Africa: Guengue, below Tete, Zambesi River (Bouvier); Masiene, between Chai Chai and Inhambane (S. Afr. Mus.).

Distribution.—Throughout East Africa to Egypt; Mauritius; Madagascar; India, China, East Indies, Queensland.

Remarks.—I have not considered it worth while to detail separately the localities of the vars. *natalensis* and *paucipara* recorded from South Africa, for the reason that both varieties have been recorded from some of the localities. Moreover, all the ovigerous specimens in the South African Museum have large ova as in *paucipara*, but combined with a short dactyl on 5th leg as in *natalensis* (see de Man, 1908). As more and more material from numerous localities is examined, the value of these varietal names seems to diminish.

Ovigerous ♀♀ (S. Afr. Mus. coll.) were taken in July, September, December, and January (Natal localities), and October (Warrenton).

Together with 80 specimens from Warrenton (Vaal River) with normal rostra, there are 3 in which the rostrum is dentate to the apex, and 2 intermediates, *i.e.* with one or two spaced teeth on the part which is normally smooth. The fully dentate specimens are very like *africana* but lack the peculiar telsonic spines said to be characteristic of this latter species. Among 38 specimens from Parys there are 2 intermediates.

In two of the large East African Lakes Gordon (*l. c.*, 1930) has shown the presence of a *lacustrine* form differing from the ordinary *fluviatile* form by having a more slender rostrum.

In Zululand these shrimps were killed in the rivers as a result of the D.D.T. spraying operations against tsetse-fly.

Caridina ? *indistincta* Calman

Fig. 123, *o*, *p*.

1926. Calman, Ann. Mag. Nat. Hist., ser. 9, vol. xvii, p. 244, fig. 3 (rostrum).

1942. Woltereck, *l. c.*, p. 290, fig. 14 (rostra).

Rostrum about 1½ times as long as carapace, extending well beyond antennal scale, armed throughout its dorsal margin with about 38–42 teeth, of which 4 are post-orbital, ventrally with 16–22 adpressed teeth. No antennular tubercle. Finger longer than palm in both 1st and 2nd legs. Dactyl of 5th leg about 3¼ times as long as wide, with 36 spines along margin. Telson in 2 of the specimens with median triangular point, flanked by 3 pairs of spines between the large lateral ones, the innermost pair slender and shortest; in the 3rd specimen apically rounded-truncate, with a median seta flanked by only 1 pair of spines between the large lateral pair.

Length 22 m.

Locality.—Victoria Falls, Zambesi River (S. Afr. Mus., ex coll. Dr. Arnold, Rhodesian Mus.).

Remarks.—As regards the rostrum the nearest form appears to be *nilotica* var. *stylirostris* Bouvier (*l. c.*, fig. 309) from Madagascar. But far more material is required. Two specimens with complete rostra have the telson as in the right-hand figure; a third with incomplete rostrum has the telson as in the left-hand figure.

C. indistincta was described from Queensland. Woltereck has referred specimens from Luapula River, Lubumbashi River, and Lake Moeru in the Belgian Congo to this species.

Caridina africana Kingsley

Fig. 123, *m*, *n*.

1882. Kingsley, Bull. Essex Inst., xiv, p. 127, pl. 1, fig. 3.

1910. Stebbing, *l. c.*, p. 394 (in note on *nilotica*).

1912. Lenz, Ark. Zool., vii, no. 29, p. 5.

1925. Bouvier, *l. c.*, p. 212, figs. 308 (telson, as *nilotica*), 470–477.

1930. Gordon, *l. c.*, pp. 36, 38, 39, 43, 46, 49, figs. 6 (telson), 13, *a* (rostrum).

1933. *Id.*, *l. c.*, p. 357, fig. 4 (pleopod 1 ♂).

? 1942. Woltereck, *l. c.*, p. 293, figs. 15–18 (rostra) (*togoensis*).

[? Not *africana* de Man 1897, nor *africana* var. *natalensis* Bouv. 1925. =*nilotica*.]

Rostrum shorter than carapace (Gordon, 1930, p. 49), extending to end of antennal scale, armed along nearly whole dorsal margin with 13–26 teeth, of which 3–4 are post orbital, ventrally with 4–5 or 8–10 teeth. Infra-orbital angle developed as an incurved lobe. No antennular tubercle. Dactyl of 5th leg longer and more slender than in *nilotica* (Gordon, *l. c.*). Telson with rounded-truncate apex, with several plumose spine-setae between the outermost large pair of spines, usually consisting of a short spiniform basal part and a terminal slender plumose part.

Localities.—Zululand (Kingsley); Amanzimtoti, Natal (Lenz).

Remarks.—de Man's single (♂) specimen (Umhloti River) was 25 mm. long, rostral formula $\frac{1}{4}^{0}$, the upper apical margin being smooth (as in *nilotica*). The dactyl of 5th leg is very short (contrast Gordon's statement), about 3 times as long as broad, with 21 spines (fig. 123, *k*, *l*).

This form was given the varietal name *natalensis* by Bouvier. I am inclined to think that it is really only an aberration of *nilotica*.

Woltereck has assigned specimens with rostra very similar to Bouvier's and Gordon's figures, from Lakes Moeru and Bangweulu and other localities in the Belgian Congo, to *togoensis* Hilg. No mention is made of *africana*.

Family OPLOPHORIDAE.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 104 (*Miersiidae*).

1910. *Id.*, *l. c.*, p. 394 (*Oplophoridae*).*

1920. de Man, Siboga Exp. monogr., xxxix*a*, 3, pp. 41 *sqq.* (list of species).

1924. Gurney, "Terra Nova" Exp., zool., viii, p. 106 (larval stages).

1925. Balss, D. Tiefsee Exp., xx, p. 239 (key to genera).

1936. Chace, J. Wash. Ac. Sci., xxvi, p. 24.

1940. *Id.*, Zoologica, xxv, p. 132.

Rostrum usually long. Mandible with 3-jointed palp, molar and incisor process indistinctly separated. Mxp. 2 with terminal joint attached laterally to penultimate. Exopod of mxp. 1 without flagellum. Exopods and epipods on all legs. Last 3 pairs of legs not abnormally long. Chelae of first 2 legs small. Telson acute.

Remarks.—Pelagic forms, sometimes with reduced eyes, or with luminous organs.

Oplophorus grimaldii Coutière is recorded (Lenz and Strunck, 1914) from 30° 21′ S., 14° W.

The preparation of the report on the "Discovery" material of this family has been interrupted by the lamented death of Dr. S. Kemp.

Key to the South African Genera (adapted from Chace).

A. Exopod of at least mxp. 3 and 1st leg foliaceous and rigid. Outer margin of antennal scale spinose. 2nd–4th or 3rd–5th abdominal segments with long medio-dorsal teeth. Telson apically acute. Eyes large, pigmented. Eggs large . . . . . [*Oplophorus*].

B. None of the exopods foliaceous or rigid.

1. 6th abdominal segment not dorsally carinate. Eggs large.

* Etymology demands the aspirate, but the International nomenclatorial rules call for the exact original spelling, viz. *Oplophorus* as written by Milne Edwards. Agassiz in 1846 emended the name to *Hoplophorus*, which, however, is preoccupied by Lund, 1838.

a. Eyes very large, well pigmented. Anterior margin of 1st abdominal segment with distinct lobe or tooth overlapping carapace (fig. 124, *a*). Telson apically acute . . . . . *Systellaspis.*

b. Eyes very small, feebly pigmented. 1st abdominal segment not lobate (fig. 124, *b*). Telson apically truncate . . . . . *Hymenodora.*

2. At least the last 4 abdominal segments carinate. Eggs small.

a. Usually no lateral keel on carapace. Incisor process of mandible toothed along whole cutting-edge (fig. 124, *c*) . . . . *Acanthephyra.*

b. At least one lateral keel on carapace. Anterior half of cutting-edge of mandible smooth (minutely denticulate) (fig. 124, *i*) . . *Notostomus.*

Gen. Systellaspis Bate

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 757.
1905. Coutière, Bull. Mus. ocean. Monaco, No. 48, p. 5.
1925. Balss, *l. c.*, p. 241.
1940. Chace, *l. c.*, p. 179.
1941. Gurney, J. Linn. Soc. Lond., xli, p. 103.

Carapace without horizontal keel or oblique hepatic keel. Sixth abdominal segment not dorsally carinate. Telson apically acute. Exopods of mxp. 3 and legs not foliaceous or rigid. Eyes well pigmented, usually large. Outer margin of antennal scale not spinose. Whole of cutting-edge of mandible toothed. Eggs large. Luminous organs in some species.

Systellaspis debilis (M. Edw.)

Fig. 124, *a*.

1910. Kemp, Fish. Irel. Sci. Invest. [1908], i, p. 59, pl. 6, figs. 1–15.
1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 13 (*Acanthephyra d.*).
1925. Balss, *l. c.*, p. 242.
1939. Calman, John Murray Exp., vi, p. 189.
1940. Chace, *l. c.*, p. 181, figs. 51–53.

Rostrum slender, longer than carapace, 3–5 teeth on its basal crest (2–3 behind orbit), followed by 9–12 teeth dorsally, 8–11 ventral teeth. Branchiostegal spine sharp but not supported by a definite keel. Abdominal segment 3 and hinder part of 4 dorsally carinate, 3rd segment ending in a sharp spine, 4th and 5th in small points; lateral

margins of 4th and 5th denticulate; a notch in hind margin of 5th pleuron; 6th segment twice as long as 5th in young, less in adults. Telson with 3–5 pairs of dorsal spinules, apically with 5 pairs of

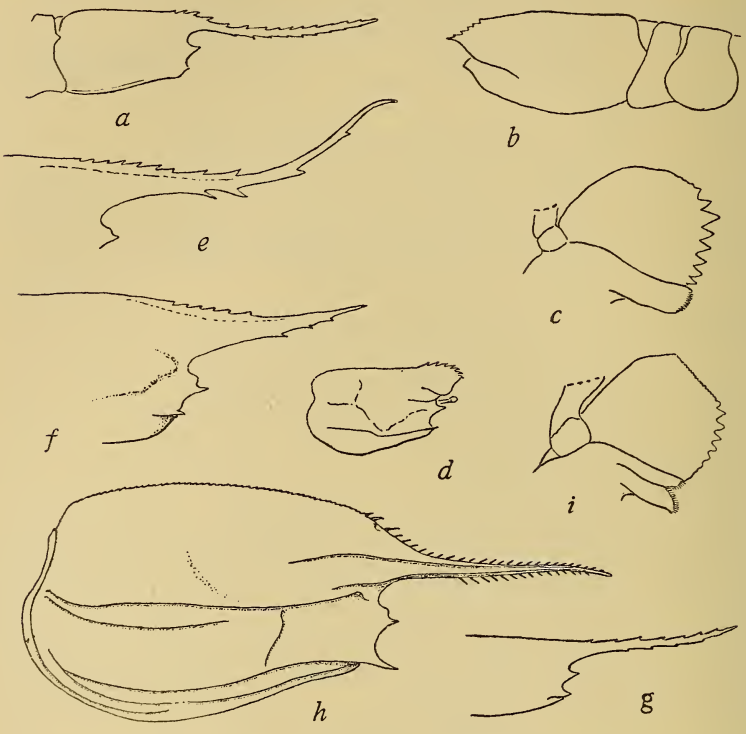


FIG. 124.—*Systellaspis debilis* (M. Edw.). *a*, carapace and 1st abdominal segment (after Chace).
Hymenodora glacialis (Buchholz). *b*, carapace and 1st and 2nd abdominal segments (after Kemp, 1910).
Acanthephyra. *c*, mandible (palp not completely drawn).
Acanthephyra stylorostratis (Bate). *d*, carapace (after Chace).
Acanthephyra eximia S. I. Smith. *e*, *f*, rostrum of typical form and of var. *brachytelsonis* (after Balss).
Acanthephyra quadrispinosa Kemp. *g*, rostrum.
Notostomus auriculatus Kemp. *h*, carapace. *i*, mandible (palp not completely drawn).

spines, the 1st pair much stouter than the others. Photophores present on carapace, abdomen, eye-stalk, and bases of appendages: 12 (6 pairs in young)–147 (paired and unpaired) in adult (Kemp, 1910, pp. 61, 64; Chace, 1940, pp. 182, 204).

Length up to 78 mm. Bright scarlet, eyes dark brown, photophores deep blue.

Localities.—Off Cape Point, 500–1500 fathoms (Calman); Natal coast, 760 fathoms (Calman); 33° 23′ S., 16° 19′ E., and 37° 31′ S., 17° 1′ E. (Balss).

Distribution.—N. and W. Atlantic, Indo-Pacific.

Gen. Hymenodora Sars

1877. Sars, Arch. Math. Naturv., ii, p. 340.*

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 838.

1910. Kemp, Fish. Irel. Sci. Invest. [1908], i, pp. 56 (in key), 72.

1925. Balss, *l. c.*, p. 270.

1941. Gurney, *l. c.*, p. 103 (reference to eggs and development).

Integument thin, membranous. Rostrum short, dorsally serrate. Abdominal segments not dorsally carinate. Telson apically truncate. Endopod of mxp. 1 composed of only 2 joints. The 2 inner distal lobes of mx. 2 broad and not projecting beyond the basal lobe. Exopod without flagellum. Whole cutting-edge of mandible toothed. Eyes small, feebly pigmented. Eggs large.

Hymenodora glacialis (Buchholz)

Fig. 124, *b*.

1885. Sars, Norw. N. Atl. Exp., Crust., i, p. 37, pl. 4.

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 15.

1925. Balss, *l. c.*, p. 270.

1935. Stephensen, Medd. Grönl., lxxx, Godthab. Exp. Crust. Dec., p. 68, figs. 26–30 (larval stages).

1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 265.

Carapace scarcely compressed, carinate anteriorly and produced in a short pointed rostrum, bearing 4–6 small serrations, and extending as far forward as the small, feebly pigmented eyes. Telson dorsally sulcate, with a few pairs of spinules, narrowing distally, apex with 4–7 spines, the outermost much the longest.

Length up to 83 mm. Vivid blood-red, eyes opaque white (Sars).

Locality.—Off Cape Point, 1014 and 1500 fathoms (Calman).

Distribution.—N. Atlantic, N. and E. Pacific, as far as Panama and Ecuador.

* *Teste*, Pruss. Akad. Nomencl. Anim. and Neave's Nomencl. Zool. Bate and Balss quote "vii, p. 345."

Gen. Acanthephyra M. Edw.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 106.
1910. *Id.*, *l. c.*, p. 394.
1920. de Man, *l. c.*, pp. 43, 53.
1923. Stephensen, Dan. Oceanogr. Exp., no. 7, p. 43.
1925. Balss, *l. c.*, p. 250 (key to species).
1939. Kemp, Ann. Mag. Nat. Hist. (xi), 4, p. 568 (revision of *purpurea* group).
1940. Chace, Zoologica, xxv, p. 133 (key to Bermuda species).
1941. Lebour, J. Linn. Soc. Lond., xli, p. 90 (larval stages).

Carapace without oblique hepatic and straight lateral keels. Rostrum variable in shape. Abdomen with at least the last 4 segments dorsally keeled, posterior teeth sometimes absent. Telson apically truncate. Exopods of mxp. 3 and legs not foliaceous or rigid. Eyes variable, but well pigmented. Outer margin of antennal scale not spinose. Whole cutting-edge of mandible toothed (fig. 124, *c*). Eggs small.

Key to the South African Species.

A. Rostrum short, elevated (fig. 124, *d*) . . . . . *stylorostratis.*
B. Rostrum slender, more or less elongate (fig. 124, *e–g*).
  1. Carapace dorsally carinate throughout its length . . *eximia.*
  2. Carapace not carinate on its hinder third.
    a. Branchiostegal spine flared outwards and supported by a conspicuous keel. Abdominal segments 3–6 each ending in a tooth.
      i. Telson with 13–19 pairs of spinules (excl. the apical group) . . . . . *acanthitelsonis.*
      ii. Telson with 7–11 pairs of spinules . . *haeckelii.*
      iii. Telson with 4 pairs of spinules . . . *quadrispinosa.*
    b. Branchiostegal spine not supported by a keel. No tooth on abdominal segments 4 and 5. Telson with 6 pairs of spinules . . . . *sexspinosa.*

Acanthephyra stylorostratis (Bate)

Fig. 124, *d*.

? 1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 724, pl. 123, fig. 3 (*Bentheocaris exuens*).
1888. *Id.*, *ibid.*, p. 726, pl. 123, fig. 4 (*Bentheocaris s.*).

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 14.

1940. Chace, *l. c.*, p. 144, fig. 22 (*stylorostrata*).

Rostrum short, high, somewhat semicircular in shape, with 7–8 spiniform teeth dorsally. Carapace carinate nearly, but not quite, to hind margin, keel not interrupted by cervical groove. Branchiostegal spine supported by a keel which extends back to hind part of branchial region. Abdomen keeled on all segments except 1st, and ending in a tooth on each of segments 3–6, that on 3rd larger than the others. Telson with 3 pairs of dorsal spinules.

Length up to 48 mm. Brilliant scarlet, eyes golden-bronze speckled with black, eggs scarlet (Chace).

Locality.—Off Natal coast, 760 fathoms (Calman).

Distribution.—Eastern N. Atlantic, off east coast of N. America; and S. Pacific (*exuens*).

Remarks.—Only a single ovigerous ♀ has been obtained in South African waters (s.s. *Pickle*).

Acanthephyra eximia S. I. Smith

Fig. 124, *e*, *f*.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 97 (*brachytelsonis*).

1920. de Man, *l. c.*, p. 55.

1925. Balss, *l. c.*, p. 258, figs. 27, 28 (and var. *brachytelsonis*).

1939. Calman, John Murray Exp., vi, p. 191.

1940. Chace, *l. c.*, p. 147, fig. 24.

Rostrum variable in length, with 6 (5–9) teeth dorsally, the distal portion unarmed, and usually 3–4 (1–5) teeth ventrally. Carapace dorsally carinate throughout its length, dorsal profile indented where crossed by cervical groove; branchial region defined above by a ridge, branchiostegal spine buttressed by a keel. Abdominal segments 2–6 (1st also in Stebbing's specimen) keeled, on 3rd–6th segments ending in teeth, that on 3rd segment largest. Telson with 3–4 pairs of dorsal spinules. Cornea wider than eye-stalk. Incisor process of mandible with 8–9 strong teeth.

Length up to 180 mm. Crimson (Alcock).

Locality.—Off Durban, Natal, 440 fathoms (Stebbing).

Distribution.—Western Atlantic, off coasts of North and South America, Indo-Pacific.

Remarks.—The s.s. *Pieter Faure* specimen is the only one recorded from South African waters.

Acanthephyra acanthitelsonis Bate

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 745, pl. 125, fig. 3.

1925. Balss, *l. c.*, p. 254.

1939. Kemp, *l. c.*, p. 574, also pp. 571, 578, 579.

Carapace not carinate on its hinder third. Branchiostegal spine strong, flared outwards, and supported by a sharp keel. Abdominal segments 3–6 keeled, each ending in a tooth, that on 3rd segment the largest. Telson with 13–19 pairs of dorsal spinules.

Length up to 134 mm.

Distribution.—Central and South Atlantic, from about 14° N. to 28° S.

Remarks.—Not yet recorded actually from South African waters.

Acanthephyra haeckelii (von Martens)

1868. von Martens, Arch. Naturg., xxxiv, Bd. i, p. 54, pl. 1, fig. 7, *a*, *b* (*Ephyra h.*).

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 739, pl. 125, fig. 1 (*sica*).

1939. Kemp, *l. c.*, p. 575, also pp. 572, 574, 578 (*haeckeli*).

1940. Chace, *l. c.*, p. 140, figs. 18–20.

1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 264.

Rostrum rather long, with 7 (–9) dorsal and 5 ventral teeth. Carapace not dorsally carinate posteriorly, dorsal profile not indented at cervical groove; branchiostegal spine supported by a keel. Abdomen as in *acanthitelsonis*. Telson with 7–11 (6–13) pairs of dorsal spinules.

Length up to 147 mm.

Locality.—Off Cape Point, 660–900 fathoms (S. Afr. Mus.).

Distribution.—N. Atlantic to 13° N.; Mediterranean; S. Atlantic from 24° S. southwards; southern Indo-Pacific northwards to 32° S.

Remarks.—Two specimens were taken by the s.s. *Pieter Faure.*

Acanthephyra quadrispinosa Kemp

Fig. 124, *g*.

1905. Stebbing, *l. c.*, p. 107, pl. 24, B (*batei*, non Faxon).

1908. *Id.*, Ann. S. Afr. Mus., vi, p. 35 (probably var. or syn. of *purpurea*).

1910. *Id.*, *l. c.*, p. 395 (*purpurea*, non M. Edw.).

1915. *Id.*, *l. c.*, p. 96 (*purpureus*, non M. Edw.).

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 12 (*purpurea*, non M. Edw.).

1925. Balss, *l. c.*, p. 252 (*purpurea* part).

1939. Kemp, *l. c.*, p. 576, also pp. 571, 572.

1941. Hale, *l. c.*, p. 265.

Rostrum with 7 dorsal and 4 ventral teeth. Carapace not dorsally carinate posteriorly, dorsal profile not indented; branchiostegal spine strong, flared outwards, buttressed by a conspicuous keel. Abdominal segments 3–6 each with a tooth, that on 4th segment a little smaller than that on 5th. Telson with 4 pairs of dorsal spinules.

Length up to 111 mm. Bright red.

Localities.—Off Cape Point, 360 fathoms (Stebbing), 900–1800 fathoms (Calman), and 700–900 fathoms (S. Afr. Mus.); off Natal coast, 820 fathoms (Calman).

Distribution.—S. Atlantic from 32° S. to 40° S. Indo-Pacific from East African coast to 163° W., and from 25° N. to 42° S.

Acanthephyra sexspinosa Kemp

1939. Kemp, *l. c.*, p. 575, also pp. 570, 571, 574, 579.

Rostrum usually shorter than carapace. Branchiostegal spine strong, not buttressed by a keel but forming the termination of a short, smoothly rounded swelling. Abdominal segments 3 and 6 each, ending in a tooth, no tooth on segments 4 and 5. Telson with (5) 6 pairs of dorsal spinules.

Length up to 96 mm.

Distribution.—Central and South Atlantic from 17° N. to 18° S.

Remarks.—Not yet recorded actually from South African waters.

Gen. Notostomus M. Edw.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 109.

1913. Kemp, Trans. Linn. Soc. Lond., zool., xvi, p. 65 (key to species).

1920. de Man, *l. c.*, p. 46 (list of species only).

1925. Balss, *l. c.*, p. 265.

1940. Chace, *l. c.*, p. 152 (key to Bermuda species).

Carapace with an oblique hepatic keel and at least one horizontal lateral keel. At least the last 4 abdominal segments keeled. Telson

apically truncate. Exopod of mxp. 3 and legs not foliaceous or rigid. Eyes well pigmented. Outer margin of antennal scale not spinose. Incisor process of mandible toothed for only half the length of the cutting-edge. Eggs small.

Notostomus [*auriculatus* Kemp, ined.]

Fig. 124, *h*, *i*.

1905. Stebbing, *l. c.*, p. 110 (*westergreni*, non Faxon).

1910. *Id.*, *l. c.*, p. 395 (*westergreni*, non Faxon).

Carapace strongly arched; 5 lateral keels on its posterior half, the uppermost extending almost to the orbital margin; post-orbital keel continuous with ventro-lateral rostral keel. Abdominal segments 1 and 2 dorsally keeled, segments 3–6 keeled and each ending in a tooth.

Length 144 mm., carapace with rostrum 74 mm. Bright red.

Locality.—Off Cape Point, 800 fathoms (Stebbing).

Remarks.—Stebbing (1905) noted that the strong posterior tooth on 6th abdominal segment might indicate a species different from *westergreni*. The specimen was seen by Kemp and named by him in MS.

Family NEMATOCARCINIDAE.

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 296.

1914. *Id.*, Ann. S. Afr. Mus., xv, p. 43.

1920. de Man, Siboga Exp. monogr., xxxix*a*, 3, pp. 72 *sqq.* (list of species).

1925. Balss, D. Tiefsee Exp., xx, p. 271.

Rostrum well developed. Flagella of both ant. 1 and ant. 2 very long. Mandible deeply cleft between molar and incisor processes, palp 3-jointed. Mxp. 2 with terminal joint attached laterally to 6th joint. Exopod of mxp. 1 with flagellum. Exopods and epipods on 1st–4th legs. Last 3 pairs of legs very long and slender, with thickened, splice-like articulation between 3rd and 4th joints (fig. 125, *c*), 4th and 5th joints very long. Dactyls of 3rd and 4th legs spiniform, of 5th leg short, more or less concealed in a tuft of bristles (fig. 125, *d*, *e*, *n*). Chelae of first 2 legs small. Telson acute. Last 3 thoracic sternites in ♂, in ♀ only the ante-penultimate sternum, strongly carinated.

Remarks.—The deeply cleft mandible is another feature in favour of Alcock's view that the *Nematocarcinidae* ought not to be separated from the *Pandalidae.* And it is remarkable that both Borradaile (1907) and Balss (1927) should have overlooked the cleft mandibles and included this family in the superfamily (tribe) *Hoplophoroida* defined as having (*inter alia*) imperfectly cleft mandibles.

Calman, and Balss, think that these Crustacea are bottom-dwellers (benthic), and the long legs are used like stilts for walking over the soft ooze.

A single genus.

Gen. Nematocarcinus M. Edw.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 43.
1920. de Man, *l. c.*, pp. 72 *sqq.*

Key to the South African Species.

1. Rostrum (if fully developed) longer than rest of carapace. Minimum abdominal length of ♂ with *two* appendices on 2nd pleopod about 63 mm. Minimum abdominal length of ovigerous ♀ 65 mm. . . . . *longirostris.*
2. Rostrum shorter than rest of carapace. Abdominal length of ♂ with two appendices on 2nd pleopod 42 mm. Abdominal length of ovigerous ♀ 58 mm. . . . *parvidentatus.*

Nematocarcinus longirostris Bate

Fig. 125, *a–k.*

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 44 (*lanceopes*, non Bate).
1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 15 (*lanceopes*, non Bate).

Rostrum, when normally and fully developed, longer than, or at least as long as rest of, carapace (measured from tip to orbital sinus, and from latter to mid-dorsal point of hind margin of carapace); often obviously in course of regeneration (fig. 125, *f*); armed above proximally with numerous small close-set spines passing gradually into more widely spaced denticles or serrations distally, about 6–8 of the latter usually distinct; below with 5–6 denticles distally, setose proximally. Cervical groove faintly indicated, and a faint curved ridge laterally on hinder part of carapace. Eyes moderately large. Abdominal segments not dorsally carinate or ending in points, though

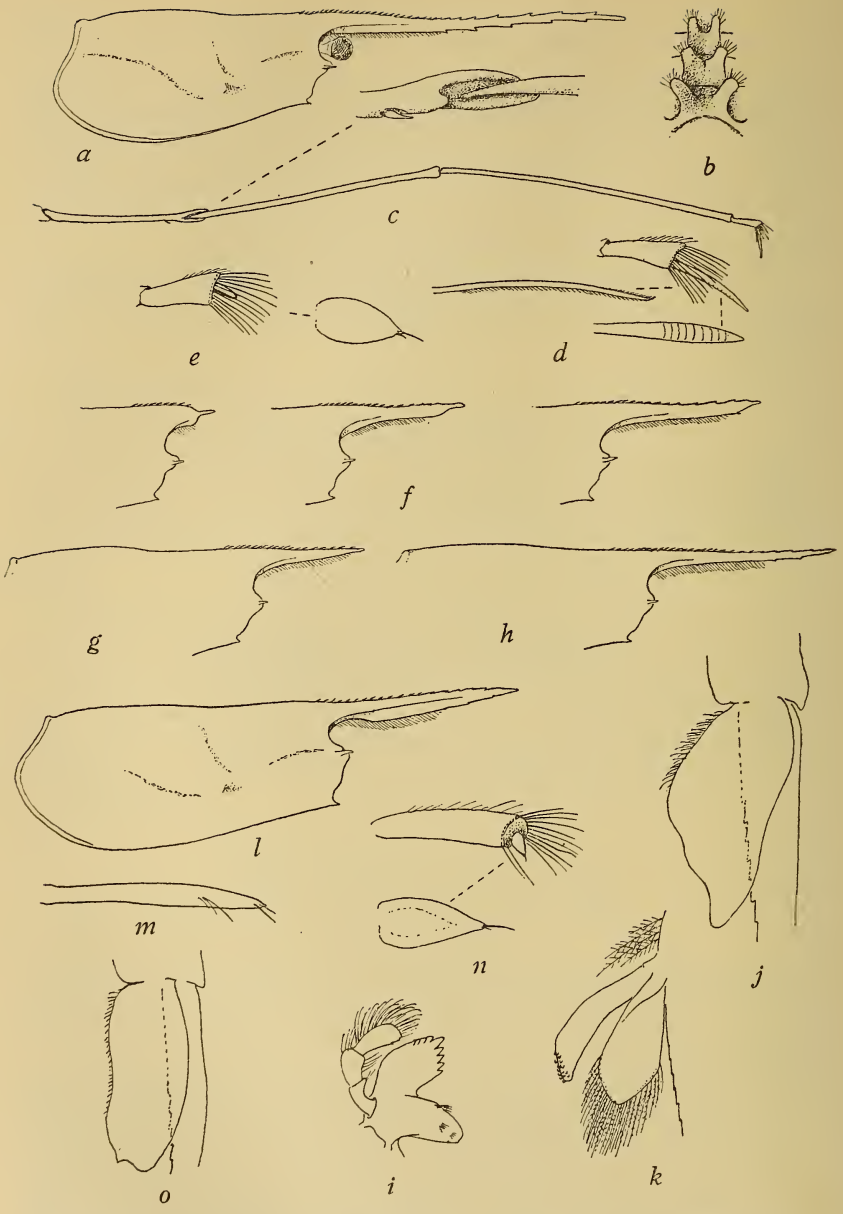


FIG. 125.—*Nematocarcinus longirostris* Bate. *a*, carapace. *b*, 3rd–5th thoracic sternites ♂. *c*, 3rd leg, with junction of 3rd and 4th joints further enlarged. *d*, 6th joint and dactyl of 3rd (and 4th) leg, with dactyl and seta on 6th joint further enlarged. *e*, 6th joint and dactyl of 5th leg, with dactyl further enlarged. *f*, three stages in regeneration of rostrum, specimens with carapace (excl. rostrum) length 32–34 mm. *g*, brevirostrate carapace of juv., carapace length 17 mm., rostrum 8 mm. *h*, the same; longirostrate, carapace 17 mm., rostrum 14 mm. *i*, mandible. *j*, endopod of pleopod 1 ♂. *k*, appendix interna and appendix masculina of pleopod 2 ♂.

Nematocarcinus parvidentatus Bate. *l*, carapace. *m*, ventral view of dactyl of 3rd leg. *n*, 6th joint and dactyl of 5th leg, with dactyl further enlarged (some of the setae on apex of 6th joint omitted). *o*, endopod of pleopod 1 ♂.

the 3rd segment is somewhat protuberant medio-dorsally; 6th segment not quite twice as long as 5th. Telson subequal to or a little longer than 6th segment, extending to apex of outer ramus, but beyond apex of inner ramus, of uropod; dorsally with 6–8 spinules excluding apical spines, minute and obscure proximally. Mxp. 3 extending $\frac{3}{4}$ along antennal scale. 1st leg extending to about end of antennal scale or end of 4th joint of 3rd leg; 2nd leg about $\frac{2}{3}$ along 3rd leg; 3rd–5th legs when extended forwards of approximately equal length. Dactyl of 3rd and 4th legs subequal to or slightly longer than 6th joint, elongate unguiform, *i.e.* wider when viewed dorsally than when viewed laterally, concave ventrally, with an appearance of being segmented. Dactyl of 5th leg much shorter than 6th joint, lanceolate. Apices of 4th joints not dentiform in any of the legs. An adpressed but movable spine on lower surface of 3rd joint distally (just proximal to swollen articulation with 4th joint) on 1st–3rd legs, but not on 4th or 5th legs. Last 3 thoracic sternites each with a conspicuous bifid process in ♂, in ♀ only the ante-penultimate process well developed. Abdominal sternites 1 and 2 in juv. and ♂ each with a pair of denticles on hind margin, suppressed in adult ♀.

Length (from tip of telson to front margin of 1st abdominal segment, and from tip of telson to orbital sinus resp.) ♂ 74 and 103 mm., ♀ 93 and 128 mm.; smallest ovig. ♀ resp. 65 and 91 mm. Deep red.

Locality.—Off Cape Point, 460–1200 fathoms (Stebbing, Calman, and S. Afr. Mus.).

Distribution.—Japan. *N. proximatus* Japan, East Indies, west coast of S. America, Marion Is.

Remarks.—Two of the lots mentioned by Stebbing (1914, p. 44) were returned to the South African Museum with his autograph labels "*longirostris*." It is not clear why Stebbing should have changed his opinion and "after long deliberation as a counsel of despair" recorded all specimens as *lanceopes*. The rostrum of the Cape specimens does not resemble that of *lanceopes*, whereas it *does* agree with that of *longirostris*, and its near ally *proximatus*.

The rostrum seems subject not so much to variation as to injury and subsequent regeneration. A few adults in the present collection show regeneration, but it seems much more frequent in juveniles. It is difficult therefore to judge whether the rostrum normally, and if so to what extent, increases in length relatively to the rest of the carapace. A selection of measurements of the mid-dorsal length of carapace to orbital sinus, and from the latter to tip of rostrum in juveniles, is given here.

Carapace	9 mm.	rostrum	4·5 mm.	(2 specimens)
	13		8	
	14		10–11	
	15		10–12	(3 ,,)
	16		13	(3 ,,)
	16		16	(2 ,,)
	17		8–9	(2 ,,)
	17		14–15	(2 ,,)
	18		8	
	18		16	
	20		11	
	24		26–28	(6 ,,)
	26		28	
	38		27	

The smallest specimen examined has a length of 22 mm. tip of telson to front margin of 1st abdominal segment, and 31 mm. tip of telson to orbital sinus.

In ♂♂ up to 60 mm. *abdominal* length there is only one appendix on the 2nd pleopod; from about 63 mm. abd. length upwards the appendix masculina is also present. This species is therefore a large one, attaining maturity at about 63 mm. abd. length in the ♂ and about 65 mm. in the ♀.

Parasites.—The Bopyrid Isopod *Hemiarthrus nematocarcini* Stebb. is found between the anterior pleopods. In one case, in spite of the size of the parasite, there was still room left between the hinder pleopods for a considerable number of the eggs of the host.

Another Isopod probably parasitic on this host is *Zonophryxus quinquedens* Brnrd.

Nematocarcinus parvidentatus Bate

Fig. 125, *l–o.*

1888. Bate, Rep. H.M.S. *Challenger,* xxiv, p. 814, pl. 132, fig. 7.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 99 (reference to page numbers in Bate misquoted).

Rostrum less than length of rest of carapace, deeper than in *longirostris* specimens with abnormally short rostra, and with distinct sinuosity at base ventrally; armed above with spinules (not so closely set as in *longirostris*) passing into denticles (about 6) distally, below with setae and 3–4 obscure denticles. Other characters as in *longirostris* (so far as ascertainable from the material at hand).

Length (abdominal and from tip of telson to orbital sinus resp.) ♂ 42 and 58 mm., ♀ 58 and 82 mm.

Localities.—Off Durban, 440 fathoms (Stebbing); off East London, 400 fathoms, off Cape Point, 660–900 fathoms (S. Afr. Mus.).

Distribution.—Japan.

Remarks.—Stebbing's specimen is a ♂ with appendix interna and appendix masculina on pleopod 2, with abdominal length 38 mm., carapace to orbital sinus 15·5 mm., and rostrum 7·5 mm.

Four specimens from off Cape Point (660 fathoms) comprise 1 ♂ with both appendices on pleopod 2, measuring (as above, resp.) 42, 17, and 8 mm.; 2 non-ovigerous ♀♀ measuring, carapace 18 and 21 mm., rostrum 10 and 15 mm.; and 1 ovig. ♀ measuring, abdomen 58 mm., carapace 23 mm., rostrum 15 mm. There are two specimens in poor condition from 800 to 900 fathoms.

Not only the shape of the rostrum, but the smaller size at which the ♂ develops the appendix masculina and the ♀ becomes ovigerous, indicate that this is an entirely different species from *longirostris*.

Family PANDALIDAE.

1910. Stebbing, *l. c.*, p. 391.

1914. *Id.*, Ann. S. Afr. Mus., xv, p. 36.

1920. de Man, Siboga Exp. monogr., xxxix*a*, 3, pp. 100 *sqq.* (key to genera and list of species).

1924. Gurney, "Terra Nova" Exp., zool., viii, p. 113 (larval stages).

1937. Gurney, Proc. Zool. Soc. Lond., ser. B, p. 330, figs. (larval stages, *Chlorotocella*).

1940. Lebour, J. Mar. Biol. Assoc. Plym., xxiv, pp. 239 *sqq.* (larval stages).

1940. Chace, Zoologica, xxv, p. 190.

Rostrum well developed. Mandible deeply cleft into molar and incisor portions, palp usually 3-jointed. Mxp. 2 with 7th joint attached laterally to 6th. Exopod of mxp. 1 with flagellum. Mxp. 3 with or without exopod; exopods absent from all legs. Epipods on mxp. 1–3, present or absent on legs 1–4. 1st leg simple or microscopically and imperfectly chelate; 2nd leg minutely chelate, with bi-, tri-, or multi-articulate wrist; 3rd–5th legs long and slender. Telson acute.

Remarks.—*Pantomus* (Gulf of Mexico) is remarkable for its movably articulated rostrum (cf. *Rhynchocinetes*, p. 763).

Key to the South African Genera.

1. Wrist of 2nd leg composed of more than 3 jointlets.
   a. Carapace with post-rostral keel only.
      i. Mxp. 3 without exopod. Post-rostral keel with movable spines . . . . . *Pandalina.*
      ii. Mxp. 3 with exopod . . . . . *Plesionika.*
   b. Carapace with lateral and post-rostral keels . . . *Heterocarpus.*
2. Wrist of 2nd leg composed of 2 jointlets . . . . *Chlorotocus.*

Gen. Pandalina Calman

1899. Calman, Ann. Mag. Nat. Hist. (7), iii, p. 37.
1910. Kemp, Fish. Irel. Sci. Invest. [1908], i, p. 97.
1920. de Man, *l. c.*, p. 102 (in key).
1946. Holthuis, Zool. Med., xxvi, p. 281.

Carapace smooth except for the post-rostral keel, rostrum half as long as rest of carapace, armed with movable spines and fixed teeth above, and fixed teeth below. Eyes large, cornea wider than stalk. Lateral process of ant. 1 distally broad and rounded (fig. 126, *b*). Posterior lobe of mx. 2 (scaphognathite) truncate (fig. 126, *c*). Mxp. 3 without exopod. 2nd pair of legs unequal in length and dissimilar on the two sides, wrist of one with 4, of the other with many, jointlets. Epipods on legs 1–4. Gills 8, plus 6 epipods, arthrobranchs absent from all legs.

Remarks.—Differs from *Pandalus* in the truncate posterior lobe of mx. 2, the twofold character of the armature on rostral keel (in *Pandalus* all movable spines), and the absence of arthrobranchs from the legs.

Pandalina brevirostris (Rathke)

Fig. 126, *a–e.*

? 1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 670, pl. 114, fig. 4 (*Pandalus modestus*).
1899. Calman, *l. c.*, p. 37, fig. 4 on pls. 1–4.
1910. Kemp, *l. c.*, p. 97.
1910. Stebbing, *l. c.*, p. 392 (*Pandalus modestus*, quoted after Bate).
1914. *Id.*, *l. c.*, p. 36 (*Pandalus modestus*).

1940. Lebour, *l. c.*, p. 243, fig. 3 (1st larval stage).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 384.

Post-rostral keel with 5 movable spines, rostrum a little more than half length of carapace, with 3–5 teeth above, 2–4 below; antennal spine and branchiostegal tooth distinct. Basal joint of ant. 1 with denticle on inner margin; flagella longer in ♂ than in ♀. Antennal scale only slightly narrowed distally, the lamellar part apically rounded, extending about as far as spine at end of straight outer margin. 2nd pair of legs with wrist multi-articulate on right, 4-articulate on left. Dactyl of 3rd–5th legs with 4–5 spinules proximally on inner margin; dactyl of 3rd leg $\frac{1}{3}$ length of propodus, of 5th leg shorter ($\frac{1}{4}$). 3rd abdominal segment slightly keeled posteriorly where it overhangs the 4th segment. Telson subequal to 6th segment and shorter than uropods, with 7 pairs of dorso-lateral spines, and 2 longer pairs on apex.

Length up to 30 mm.

Localities.—35° 4′ S., 18° 37′ E. (western slope of Agulhas Bank), 150 fathoms (Bate); exact locality uncertain (Stebbing); off Saldanha Bay, 145 fathoms, off Cape Peninsula, 190 fathoms, and off East London, 195 fathoms (S. Afr. Mus.).

Distribution.—N.E. Atlantic to Mediterranean, littoral to 584 fathoms. Barents Sea.

Remarks.—If Stebbing had recalled Calman's definitions of *Pandalus* and *Pandalina* he would have recognized the resemblance of this form to *Pandalina brevirostris*. In addition to Stebbing's 3 specimens there are 19 specimens, and I fail to find any points of disagreement between them and Calman's description and figures, except the length of the dactylus of 3rd leg. Calman makes no mention of a spine or denticle on inner margin of basal joint of ant. 1, and I have no northern specimens for comparison.

Although Bate utilized the dimorphic character of the rostral and post-rostral armature for generic purposes, and although he placed his species *modestus* in *Pandalus* (all movable spines on dorsal profile of carapace), it is more than probable that *modestus* is the form here discussed.

Holthuis (1946, Zool. Meded., xxvi, p. 281, fig. 1, *a–c*) has described *P. profunda* a deep-water form distinct from *brevirostris*, but which bears a curiously close resemblance to Bate's *modestus*. Holthuis (in litt. 22/1/47), however, does not think *profunda* is the same as *modestus*. A final decision must await the re-examination of Bate's type, if it is still available.

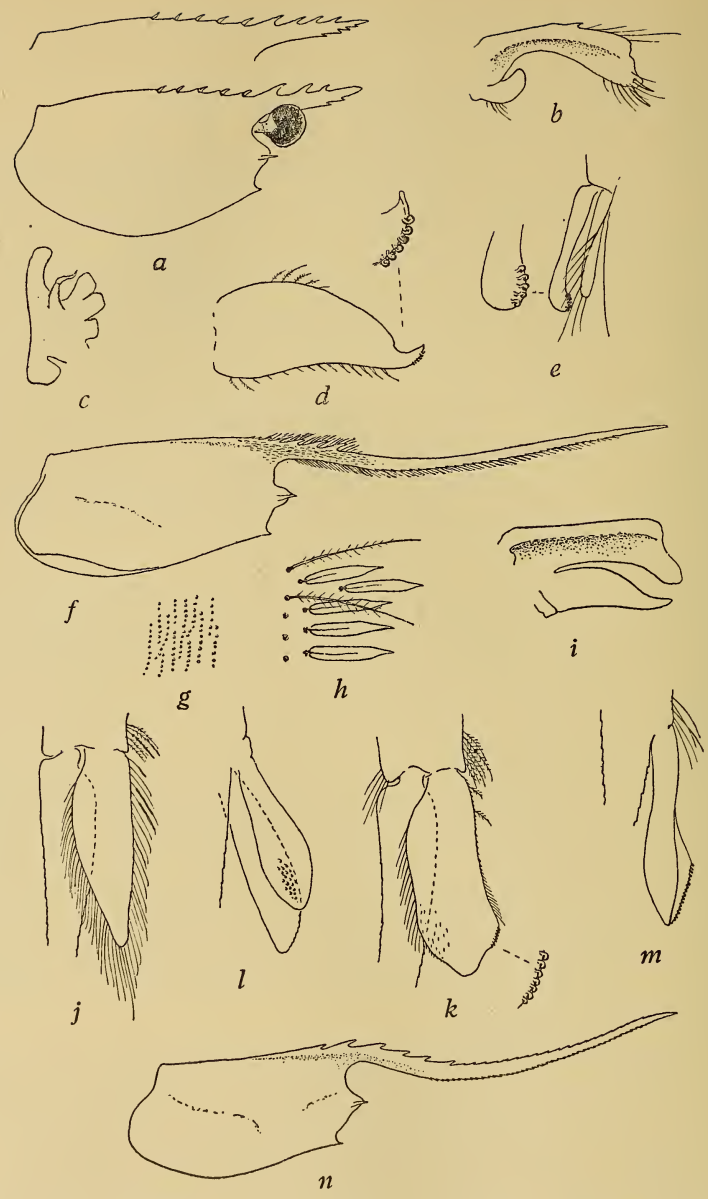


FIG. 126.—*Pandalina brevirostris* (Rathke). *a*, carapace, with dorsal profile of another specimen. *b*, basal joint of ant. 1. *c*, maxilla 2, setae omitted. *d*, endopod of pleopod 1 ♂. *e*, appendix interna and appendix masculina on pleopod 2 ♂.
Plesionika martia (M. Edw.). *f*, carapace. *g*, portion of surface of integument. *h*, the same further enlarged, with spines and setae, from 6th abdominal segment. *i*, basal joint of ant. 1, setae omitted. *j*, endopod of pleopod 1 ♀. *k*, endopod of pleopod 1 ♂. *l*, appendix interna and appendix masculina on pleopod 2 ♂, setae on latter omitted. *m*, appendix interna on pleopods 2–5 ♀.
Plesionika longirostris (Borrad.). *n*, carapace.

Gen. Plesionika Bate

1910. Stebbing, *l. c.*, p. 392.

1914. *Id.*, Ann. S. Afr. Mus., xv, p. 37.

1920. de Man, *l. c.*, pp. 105 (list of species), 111 (key to species).

1939. Calman, John Murray Exp., vi, p. 197.

Carapace smooth except for the post-rostral keel, rostrum usually at least as long as carapace, post-rostral keel and rostrum armed above with fixed teeth, rostrum with or without teeth on ventral edge. Cornea large, often with an ocellus behind it. Lateral process of basal joint of ant. 1 acute (fig. 126, *i*). Posterior lobe of mx. 2 rounded. Mxp. 3 with exopod. 2nd pair of legs subequal or conspicuously unequal. Epipods on legs 1–4 (except *minor* Calman). Gills 12, plus 6 epipods (Kemp: 6, Alcock: 7), including arthrobranchs on legs 1–4.

Remarks.—Although the rostral armature consists of all movable spines in *Pandalus*, *Plesionika* is regarded by some authors as only a subgenus of *Pandalus*.

Odhner (1923, Medd. Göteb. Mus., xxxi, p. 4) records the Mediterranean *P. heterocarpus* from Port Alexander, Angola.

Key to the South African Species.

1. Upper margin of rostrum with teeth only at base . . . *martia.*
2. Whole upper margin of rostrum with teeth . . . . . *longirostris.*

Plesionika martia (M. Edw.)

Fig. 126, *f–m.*

1910. Stebbing, *l. c.*, p. 392.

1920. de Man, *l. c.*, p. 113 (in key), and var. *semilaevis*, p. 116, pl. 10, figs. 24, 24, *a*, *b*.

1925. Balss, D. Tiefsee Exp., xx, p. 278.

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 17.

1926. Schmitt. Biol. Res. "Endeavour," v, p. 377.

1939. Calman, *l. c.*, p. 197.

1940. Chace, *l. c.*, p. 190, fig. 57.

Whole integument, including telson and uropods, under a low magnification appearing squamose; this appearance caused by numerous short, more or less transverse series of pits; these are probably setiferous or spiniferous in freshly moulted specimens, but on the exposed parts of the body appear to be easily rubbed off; in

protected parts, such as the base of the rostrum and below the post-rostral crest, and near the lower margin of 6th abdominal segment, elongate lanceolate scale-like spines, mixed with less numerous plumose setae, arise from the pits. Rostrum $1\frac{1}{4}$–$2\frac{1}{2}$ times length of rest of carapace, bending downwards and then slightly upwards in a gentle curve, armed above at base only with 5–10 (usually 7–8) teeth, decreasing in size backwards, the hinder 3 or 4 post-orbital; ventral margin with a large number of fine teeth. Carapace smooth, with post-antennal spine and sharp pterygostomial point. A well-marked submarginal keel or raised line across postero-lateral corner. Abdominal segments not carinate. Telson subequal to 6th segment and to inner ramus of uropod, with 3–4 pairs of (inconspicuous) dorso-lateral spinules. Eyes large, ocellus not separate from cornea. Apical spine and lamellar part of antennal scale extending about equally far. 2nd pair of legs symmetrical, wrist multi- (20–24) articulate. Dactyls of 3rd–5th legs short. Hind margin of sternite of abdominal segments 1 and 2 in juv. and ♂ each with a slight projection, which usually ends in two little points on segment 1 and one point on segment 2; projections suppressed in ♀♀ over 57 mm. in length. Endopod of pleopod 1 ♂ at least $\frac{1}{3}$ length of exopod, somewhat curved or concave, apex rounded, outer margin (facing the exopod) setose, inner finely spinulose, with coupling-hooks distally; in ♀ relatively smaller, ovate, both margins densely setose. Appendix interna on pleopods 2–5 ♀ distally triquetral, inner surface bearing a keel with coupling-hooks; appendix interna on pleopod 2 ♂ oval with a patch of coupling-hooks on its median surface; appendix masculina ovate, inner margin strongly setose.

Length (tip of telson to orbit) ♂ up to 76 mm., ♀ 88 mm. (Calman: total length 108 mm.). Smallest ovigerous ♀ examined 70 mm.; smallest ♂ with both appendix masculina and appendix interna developed 40 mm. Deep red. Kemp says the carapace is purplish dorsally, and the eyes black. Eggs light blue (Alcock).

Localities.—Off Cape Peninsula, 240–249 fathoms (Stebbing); 35° 10′ S., 23° E., 500 metres (Balss); Natal coast, 260–270 fathoms (Calman); off Cape Point, 250–470 fathoms, off East London, Cape Morgan, and Bashee River, 250–400 fathoms (S. Afr. Mus.); off Delagoa Bay (Gilchrist's Marine Survey).

Distribution.—Eastern Atlantic and Mediterranean, Indian Seas, Hawaiian Is., Southern Australia. var. *semilaevis*: Indo-Pacific to Japan and Australia.

Remarks.—*P. semilaevis* is regarded by de Man as a variety, in

which the rostrum is relatively shorter; in his key (1920, *l. c.*) he distinguishes *semilaevis* with rostrum 34–47 per cent. of the length (as measured above) from *martia* with rostrum 45–67 per cent. of the length. Balss and Calman regard it merely as a synonym of *martia*.

All the South African specimens, both from the Cape Point and the East London areas, appear to belong to the typical *martia* form.

Judging by the number of specimens (most of them badly damaged) caught by the s.s. *Pieter Faure*, the species is commoner in the East London area than in the Cape Point area.

No attention seems to have been paid to the character of the integument in descriptions of the species of this genus. In the present species it is so conspicuous that the absence of all mention of it is rather surprising.

Parasites.—The Bopyrid Isopod *Palaegyge plesionikae* Brnrd. is found in the branchial cavity, the ♂ sometimes amongst the pleopods.

Plesionika longirostris (Borrad.)

Fig. 126, *n*.

1914. Stebbing, *l. c.*, p. 37.

1920. de Man, *l. c.*, p. 114 (in key).

Integument regularly but sparsely pitted; the specimens are not too well preserved, but apparently only setae, no lanceolate spines, arise from the pits. No submarginal keel at postero-lateral corner of carapace. Rostrum about twice the length of rest of carapace, bending downwards and then upwards in a gentle but pronounced curve; armed above proximally with 6 teeth (2 being really post-orbital) followed by a number (*ca.* 22) of small teeth extending almost to tip; below with about 40 small, closely-set teeth. Abdominal segments not carinate. Telson distinctly shorter than 6th segment. Eye large, ocellus not separate from cornea. Antennal scale as in *martia*. 2nd pair of legs symmetrical. Dactyls of 3rd–5th legs short.

Length (tip of telson to orbit) about 30 mm. (Borradaile: ♀ 130 mm.).

Localities.—Off Durban, 185 fathoms (Stebbing); off Gt. Fish Point, 40 fathoms (S. Afr. Mus.).

Distribution.—New Britain.

Remarks.—The identification of these small and obviously immature specimens with Borradaile's species rests solely on the similarity of the rostrum. Three specimens were sent to Stebbing; and all three

were returned by him intact and undissected; his account of the mouth-parts is taken from a slide labelled "*Parapandalus longirostris*," but which includes the carapace and rostrum of a small specimen of *martia*. There are 2 other specimens, also juveniles.

Borradaile's statement that the rostrum is armed "above and below with movable spines" has been commented upon by Stebbing, and, in the case of *Parapandalus serratifrons*, by de Man (*l. c.*, p. 147).

Gen. Heterocarpus M. Edw.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 38.

1920. de Man, *l. c.*, pp. 102, 108 (list of species), 152 (key to species).

Carapace rigid, with post-rostral keel usually extending to hind margin, and three, more or less fully developed, lateral keels. Rostrum armed with fixed teeth above and below. No ocellus behind cornea. Lateral process of ant. 1 acute. Posterior lobe of mx. 2 rounded. Mxp. 3 with exopod. 2nd pair of legs more or less unequal in length, wrist multiarticulate. Epipods on legs 1–4. Gills 12, plus 7 epipods.

Key to the South African Species.

1. None of the abdominal segments keeled or produced (3rd slightly gibbose). Rostrum dentate dorsally . . *tricarinatus.*
2. Segment 3 bluntly keeled. Rostrum dorsally smooth, except for one tooth above eye . . . . . *laevigatus.*
3. Segments 3–5 keeled and acutely produced. Rostrum dorsally dentate . . . . . *dorsalis.*

Heterocarpus tricarinatus Alck. & And.

Fig. 127, *c*, *d*.

1914. Stebbing, *l. c.*, p. 39.

1920. de Man, *l. c.*, pp. 155 (in key), 161, pl. 13, fig. 38, *a–d*, pl. 14, fig. 38.

1925. Balss, D. Tiefsee Exp., xx, p. 287.

1939. Calman, John Murray Exp., vi, p. 204.

Integument tomentose, formed by ovate-lanceolate scale-like spines. Rostrum subequal to rest of carapace, gently curved upwards, with 9 (7–11, Calman: 14) teeth below, 6 (7–9) teeth above; post-rostral crest continued backwards nearly to hind margin of carapace, with 5 teeth. Post-ocular lateral ridge continued nearly to hind margin, post-antennular ridge forming a buttress to the suborbital spine, post-antennal ridge fading out about midway across branchial region. Abdominal segments smooth, not keeled or produced, but

(as in de Man's specimens) segment 3 slightly gibbose. Telson 1½–2 times length of 6th segment, with 4 pairs of dorso-lateral spinules. Lateral process of ant. 1 extending to end of 2nd peduncular joint. Antennal scale half length of carapace. 2nd pair of legs very unequal, left much longer than right. 5th leg shorter than 3rd or 4th; dactyls

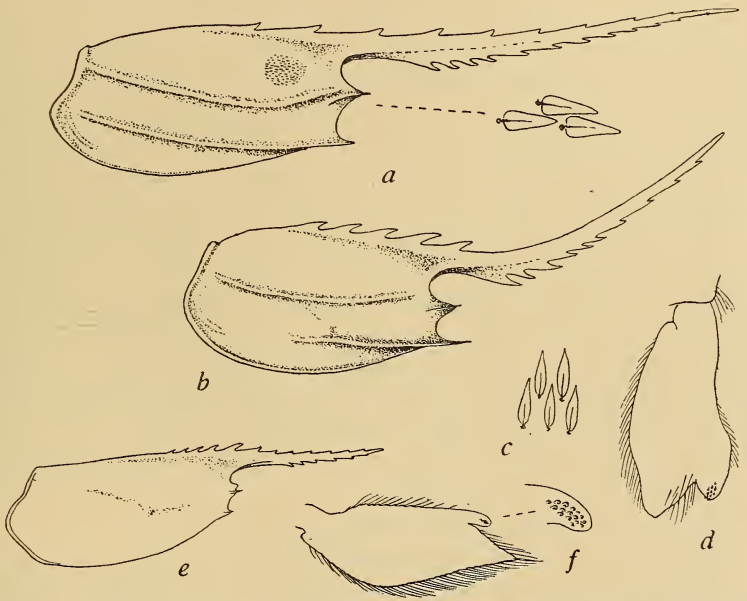


Fig. 127.—*Heterocarpus dorsalis* Bate. *a*, carapace, tomentum only partly indicated, with some of the scale-spines further enlarged.
Heterocarpus laevigatus Bate. *b*, carapace.
Heterocarpus tricarinatus Alck. & And. *c*, scale-spines from integument. *d*, endopod of pleopod 1 ♂.
Chlorotocus crassicornis (Costa). *e*, carapace. *f*, endopod of pleopod 1 ♂, with lobe bearing coupling-hooks further enlarged.

of 3rd–5th legs rather long and slender (typically *ca.* ⅓ length of 6th joint). Endopod of pleopod 1 ♂ (fig. 127, *d*).

Length (tip of telson to orbit) ♂ up to 92 mm., rostrum 27 mm. (de Man); ovig. ♀ 73 and 21 mm. resp. (Alcock).

Locality.—Off East London, 310 fathoms (Stebbing).

Distribution.—Arabian Sea; East Indies.

Remarks.—The single ♂ (returned by Stebbing) is the only specimen known from South Africa. The dactyls of the 3rd–5th legs are shorter than in the typical form (*ca.* ⅕ length of 6th joint), but not so short as in *lepidus* de Man.

Heterocarpus laevigatus Bate

Fig. 127, *b*.

1914. Stebbing, *l. c.*, p. 40.

1920. de Man, *l. c.*, pp. 154 (in key), 159, pl. 13, fig. 37, *a*, *b*.

Integument pitted (presumably tomentose in life). Rostrum longer than carapace, strongly curved upwards, one tooth at base above eye, rest of dorsal margin smooth, ventral margin with 10 teeth (Bate: 6; Alcock and Anderson: 11–13); post-rostral crest extending nearly to hind margin of carapace, with 4 (5) teeth. Post-ocular lateral ridge extending nearly to hind margin; post-antennular ridge forming a short buttress to the spine; post-antennal ridge fading out at about hinder third of carapace, anteriorly the branchiostegal spine projects forwards as far as eye; near lower hind corner of carapace a short curved submarginal ridge. Abdominal segments smooth, not keeled, except 3rd which is gibbose and bluntly keeled. Lateral process of ant. 1 extending to end of 2nd peduncular joint. Antennal scale $\frac{2}{3}$ length of carapace. Left leg of 2nd pair longer than the right. Dactyls of 3rd–5th legs short and rather stout.

Length (tip of telson to orbit) ♂ up to 126 mm., rostrum 55 mm.; ♀ 123 and 42 mm. resp (Alcock).

Locality.—Off East London, 408 fathoms (Stebbing).

Distribution.—Arabian Sea; East Indies.

Remarks.—The single South African specimen is immature, measuring (as above) 40 and 22 mm. respectively.

Heterocarpus dorsalis Bate

Fig. 127, *a*.

1914. Stebbing, *l. c.*, p. 40 (*alphonsi* Bate).

1920. de Man, *l. c.*, pp. 156 (in key), 171, pl. 15, figs. 43, 43, *g*.

1925. Balss, D. Tiefsee Exp., xx, p. 285, fig. 66.

1939. Calman, John Murray Exp., vi, p. 206.

Integument tomentose, formed by cuneiform scale-spines. Rostrum as long as or longer than (up to $1\frac{1}{2}$–2 times) carapace, relatively longer in juv. than in adult, straight or slightly curving upwards, dorsal teeth usually 12–14 (range: 7–16), of which 2, occasionally 3, are on the post-rostral crest; ventral teeth usually 11–14 (6–15) (S. Afr. specimen: $\frac{2+7}{12}$); post-rostral crest continued to hind margin, with a small pit at hinder third of carapace, and behind it often a small

tubercle (both present in the S. Afr. specimen); post-ocular ridge continued to hind margin, post-antennular ridge forming a short buttress to the spine, post-antennal ridge continued to hind margin (or almost); a slight submarginal ridge at lower hind corner of carapace. Abdominal segments 3, 4, and 5 each carinate and produced in a sharp point, carina on 3rd segment fluted; a pair of inconspicuous tubercles on each side of median line on segments 1 and 2 (also on segments 3–5 in de Man's fig. 43, *b*). Telson $1\frac{1}{3}$ times length of 6th segment. Lateral lobe of ant. 1 extending to about middle of 2nd peduncular joint. Antennal scale $\frac{2}{3}$ length of carapace, the lamellar tip extending well beyond the spine. Left leg of 2nd pair longer than the right. Dactyls of 3rd–5th legs slender, rather long.

Length (tip of telson to orbit) ♂ up to 117 mm., rostrum 32 mm.; ♀ 129 and 36 mm. resp. South African ♀ 83 and 40 mm. resp.

Locality.—Off Durban, 440 fathoms (Stebbing).

Distribution.—East Indies; east coast of Africa; *alphonsi*: Indian Seas, Philippine Is., Japan.

Remarks.—The single South African specimen is a non-ovigerous ♀. In view of the large number of specimens studied by de Man, it seems that *alphonsi* should be regarded as a synonym, at the most as a variety, of *dorsalis*.

Gen. Chlorotocus M. Edw.

1914. Stebbing, *l. c.*, p. 41.

1920. de Man, *l. c.*, pp. 102 (in key to genera), 110 (list of species), 181.

Like *Plesionika*, but with the wrist of 2nd leg composed of only two unequal jointlets. Rostrum with fixed teeth. A small suborbital lobe above the post-antennular spine, but no supra-orbital spine.

Chlorotocus crassicornis (Costa)

Fig. 127, *e*, *f*.

? 1910. Stebbing, *l. c.*, p. 393 (*incertus* Bate).

1914. *Id.*, *l. c.*, p. 42, pl. xi (Crust., pl. 75).

1920. de Man, *l. c.*, p. 183 (comments on certain features).

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 16.

1939. *Id.*, John Murray Exp., vi, p. 207.

Integument closely and finely pitted (presumably tomentose in life). Carapace smooth, post-rostral crest extending about $\frac{2}{3}$ towards hind

margin, anteriorly with 4 teeth, preceded by 6–8 teeth on rostrum, which has 4–6 teeth on ventral margin. Abdominal segments not carinate, hind margin of 6th segment dorsally spinulose between the lateral points; lower margins of pleurae of segments 1–5 rounded, but lower hind corner of 5th segment quadrate. Telson with 5 pairs of dorso-lateral spinules, and a pair of large movable spines flanking the abruptly narrowed apical point. Ocellus absent. Antennal scale slightly more than half length of carapace, the spine extending beyond the lamellar tip. Mxp. 2 with 7th joint attached as a strip laterally to the 6th joint (contrast *spinicauda* de Man). Endopod of pleopod 1 ♂ (fig. 127, *f*).

Length (tip of telson to orbit) up to 43 mm., rostrum 13 mm.; another specimen 47 and 9 mm. resp. (Calman: total length 78 mm.).

Localities.—35° S., 18° 37′ E. (western slope of Agulhas Bank), 150 fathoms (Bate: *incertus*); off Cape Point, 80 and 150 fathoms, and off Durban, 185 and 205 fathoms (Stebbing, and Calman); off Cape Point, 180 fathoms, and Algoa Bay, 58 fathoms (S. Afr. Mus.).

Distribution.—Mediterranean, Zanzibar, Andaman Is.

Remarks.—Calman says the type of *incertus* is no longer extant, and Bate's species therefore remains uncertain.

A specimen 27 mm. long (measured as above) has 10 teeth dorsally, 7 on rostrum, 1 above hind margin of orbit, and only 2 on post-rostral crest.

The South African Museum registered number of one of Stebbing's specimens was recorded as "A1269" instead of "A3942"; the locality, however, is not in doubt.

Family HIPPOLYTIDAE.

1906. Calman, Ann. Mag. Nat. Hist. (7), xvii, p. 29 (key to genera).

1910. Stebbing, *l. c.*, p. 390.

1914. Kemp, Rec. Ind. Mus., x, pp. 81 *sqq.* (key to Indo-Pacific genera).

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 89.

1916. Kemp, Rec. Ind. Mus., xii, pp. 385 *sqq.*

1925. *Id.*, *ibid.*, xxvii, p. 330.

1937. Gurney, "Discovery" Rep., xiv, pp. 351 *sqq.* (larval stages).

1947. Holthuis, Siboga Exp. monogr., xxxix*a*, 8, pp. 3–77 (key to genera, list of species).

Rostrum long or short. Supra-orbital spine present or absent. Mandible with or without incisor process, and with or without palp.

Mxp. 2 with 7th joint attached laterally to 6th. Exopod of mxp. 1 with flagellum. Mxp. 3 with or without exopod. Exopods absent from all legs. Epipods 1–7 pairs. First pair of legs usually not much longer than the others, but sometimes sexually dimorphic, chelate; 2nd pair with carpus (wrist) composed of two or more jointlets. Telson tapering more or less acutely. Gills 5–6, with a varying number of epipods.

Remarks.—The majority of the members of this family are inhabitants of shallow water. There is a considerable amount of normal variation in some forms, especially in the shape and armature of the rostrum; and sexual dimorphism is often well marked.

Key to the South African Genera (after Calman, and Kemp).

I. Arthrobranchs on legs 1–4. Mandibular palp 3-jointed. Wrist of 2nd legs multiarticulate.
  A. A movable tooth at base of uropod (fig. 128, *a*) . . *Saron.*
  B. No movable tooth at base of uropod . . . *Merhippolyte.*

II. No arthrobranchs on legs.
  A. Mandible with palp.
    1. 2nd pair of legs symmetrical, wrist with 6–8 jointlets.
      a. Mandible without incisor process (S. Afr. species), palp 3-jointed. Supra-orbital spine very large . . . . *Alope.*
      b. Mandible with (small) incisor process, palp 2-jointed. Supra-orbital spine, if present, not large . . . . . *Spirontocaris.*
    2. 2nd pair of legs strongly asymmetrical, wrist with 4 jointlets. Outer margin of antennal scale serrate . . . . . *Leontocaris.*
  B. Mandible without palp.
    1. Mandible with incisor process. Supra-orbital spine present . . . . . *Hippolyte.*
    2. Mandible without incisor process. Supra-orbital spine absent.
      a. Dactyls of 3rd–5th legs uniunguiculate.
        i. Wrist of 2nd legs with 3 jointlets.
          α. Body stout. Antero-lateral corner of carapace serrate. Rostrum often very deep (fig. 131, *a*) . . . *Latreutes.*
          β. Body slender. Antero-lateral corner of carapace spiniform. Rostrum elongate (fig. 131, *d*) *Angasia.*

ii. Wrist of 2nd legs multiarticulate. Antero-lateral margin of carapace not serrate. Rostrum slender . *Hippolysmata.*

b. Dactyls of 3rd–5th legs 4-unguiculate (fig. 132, *j*). Wrist of 2nd leg with 3 jointlets . . . . . *Gelastocaris.*

Gen. Saron Thallwitz

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 34.

1947. Holthuis, *l. c.*, pp. 6, 25.

Arthrobranchs present on legs 1–4. Mandible with incisor process and 3-jointed palp. Wrist of 2nd leg with more than 7 jointlets. A movable tooth at base of uropod (fig. 128, *a*). Mxp. 3 with exopod.

Remarks.—Two species, both Indo-Pacific. Stebbing (*l. c.*) by a slip says the movable tooth is at the base of the "second peraeopods."

Saron marmoratus (Olivier)

Fig. 128, *a*, *b*.

1869. Bianconi, Spec. Zool. Mosambic., fasc. xix/xx, p. 343, Crust., pl. 3, fig. 2 (*Hyppolite* [sic] *kraussii*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 836 (*Hippolyte kraussii* Bianc.).

1914. Kemp, *l. c.*, p. 84 (references).

1914. Stebbing, *l. c.*, p. 34 (references).

1916. Kemp, *l. c.*, p. 385.

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 187, pl. 51.

1937. Gurney, *l. c.*, p. 390, figs. 106–112 (larval stages).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 80, figs. 5, 6.

1947. Holthuis, *l. c.*, p. 25.

Carapace deep, 3 teeth on post-rostral crest, the hindmost one above or behind middle of length of carapace; no supra-orbital spine; orbit oval in shape; rostrum more or less strongly curved upwards, 2 teeth proximally and 2 distally on upper margin, 6 (5–7) on lower margin, the proximal ones projecting strongly downwards and obliquely forwards; rostrum in dorsal view not very wide at base; tufts of setae at bases of post-rostral teeth, and in a few places on carapace. Upper apex of 3rd peduncular joint of ant. 1 produced in a triangular horizontal (and slightly curved outwards) process (not an upturned spine as in *neglectus*). Fingers and thumbs of 2nd chelae shorter than palm, which is usually equal to (not longer than) last jointlet of wrist,

their opposed margins smooth (serrulate in *neglectus*). 4th joint of 3rd–5th legs with 2 spines on lower distal margin (only 1 in *neglectus*). Last thoracic sternite with a bifurcate process projecting forwards, less developed in ♀ than in ♂ (not developed at all in small ovig. ♀

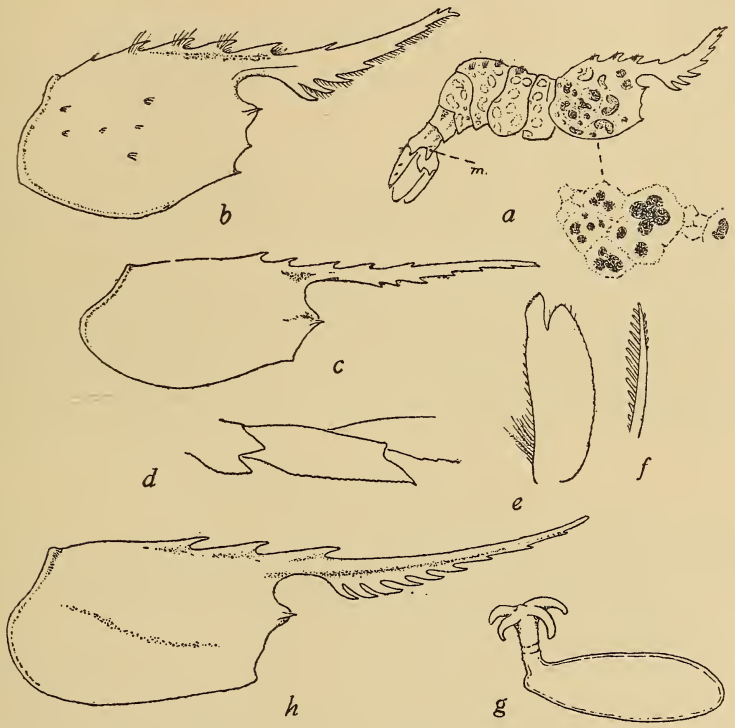


Fig. 128.—*Saron marmoratus* (Olivier). *a*, whole animal to show colour pattern, with portion of carapace further enlarged. (*m.*, movable tooth.) *b*, carapace. *Merhippolyte agulhasensis* Bate. *c*, carapace. *d*, inner view of 2nd and 3rd joints of 1st leg, setae omitted. *e*, endopod of pleopod 1 ♂, setae omitted from outer margin. *f*, spine from pit on wrist of 1st leg. *g*, *Faba*, a parasite attached to the abdomen, length of sac 2·5 mm. *Merhippolyte calmani* Kemp & Sewell. *h*, carapace.

seen by Stebbing). Abdominal sternites 1–3 ♂ each with a pair of prong-like processes on hind margin, sternites 4–6 each with a median spiniform process, that on 6th minute; in ♀ all sternites unarmed, except for the minute point on 6th sternite. Peduncles of pleopods L-shaped in cross-section; endopods larger than exopods; the 5th pleopod smaller than the others, and in ♀ taking no part in forming the incubatory pouch, without appendix interna in both sexes; in ♂ appendix interna strongly developed on pleopod 2 (no appendix

masculina), absent on pleopod 3, and reduced on pleopod 4; in ♀ appendix interna on pleopods 2 and 3 short, arising at about middle of inner margin of endopod, on pleopod 4 strongly developed, with a long row of coupling-hooks, thus together with its fellow firmly closing the incubatory pouch behind.

Length ♂ up to 68, ♀ 65 mm. Marbled and mottled with more or less circular, oval, or crescentic markings, or rings, of varying shades of brown, with faint intervening reticulation; no two specimens exactly alike in pattern.

Localities.—Mozambique (Bianconi, Hilgendorf, Stebbing); Delagoa Bay (coll. K. H. B. 1912, and C. J. van der Horst).

Distribution.—East coast of Africa, Red Sea, Indian coasts, East Indies, Pacific, Australia.

Remarks.—In the males of this prettily marked species the 3rd maxillipeds and 1st pair of legs often attain a relatively large size, measuring (Kemp, 1914) 60 or 70 per cent. or even 88 per cent. of the total length of the animal. In a Delagoa Bay ♂ 68 mm. in total length (53 mm. tip of telson to orbit) the 1st leg measures 48 mm.

Gen. Merhippolyte Bate

1910. Stebbing, *l. c.*, p. 391.
1912. Kemp and Sewell, Rec. Ind. Mus., vii, pp. 20–22.
1914. Kemp, *l. c.*, p. 88, and p. 122 (Indo-Pacific species).
1947. Holthuis, *l. c.*, p. 6.

Arthrobranchs present on legs 1–4. Mandible with incisor process and 3-jointed palp. Wrist of 2nd legs with more than 7 jointlets. No movable tooth at base of uropods. Mxp. 3 with exopod. Gills 12, plus 5–7 epipods.

Key to the South African Species.

1. 4–6 rostral and post-rostral teeth, teeth on ventral margin of rostrum equally spaced . . . . . *agulhasensis.*
2. Only 3 dorsal teeth, ventral teeth on rostrum proximally close together . . . . . *calmani.*

Merhippolyte agulhasensis Bate

Fig. 128, *c–g.*

1910. Stebbing, *l. c.*, p. 391.
? 1923. Odhner, Medd. Göteb. Mus., xxxi, p. 5.

1925. Balss, D. Tiefsee Exp., xx, p. 288.

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 17.

Carapace smooth, no supra-orbital spine, antero-inferior corner quadrate or with a small point, rostrum with 5 (rarely 4 or 6) teeth above, of which 2 are on the post-rostral crest, and 5 (4–6) below, the latter more or less equally spaced, tip bidentate. Abdominal segments not keeled; 6th segment 1½ times the 5th; postero-inferior angle of 4th ending in a short but sharp point, of 5th in a longer acute point; 1st and 2nd sternites in ♂ each with a pair of spines, 3rd with a single median spine, in ♀ sternites smooth. Telson a little longer than 6th segment, with 2 pairs of dorso-lateral spinules. Cornea large, ocellus distinct but contiguous with cornea. Lower margin of 2nd and 3rd joints of 1st leg distally produced, on the 3rd joint forming a sharp point (fig. 128, *d*). On inner (lower) surface of wrist of 1st leg near apex a shallow pit surrounded by strongly ctenate spines (fig. 128, *f*) in both sexes. Epipods on legs 1–4.

Length (tip of telson to orbit) ♂ up to 53 mm., ♀ 56 mm.; smallest ovig. ♀ 37 mm.; smallest specimen examined 20 mm. Bright red (s.s. *Pieter Faure* log-book).

Localities.—West slope of Agulhas Bank, 150 fathoms (Bate); off Cape Point, 318 metres, and False Bay, 70 metres (Balss); off Cape Peninsula and Knysna, 131 and 116 fathoms (Stebbing); Natal coast, 260 fathoms (Calman); from off Saldanha Bay around Cape Peninsula to Agulhas Bank as far east as Algoa Bay, 22–256 fathoms, and off East London, 195 fathoms (S. Afr. Mus.). Port Alexander, Angola (Odhner).

Remarks.—Bate's figure certainly exaggerates the size of the point at the postero-inferior corner of 4th abdominal segment, but not (or only slightly) that of 5th segment. Odhner states that his specimens resembled more *calmani* than *agulhasensis* in this respect; moreover, he says the 6th abdominal segment was 2–2½ times the length of 5th. Possibly his 2 specimens, with only 4 rostral teeth dorsally, represent a different species.

This species is abundant around the Cape Peninsula, but the largest number taken in any one haul by the s.s. *Pieter Faure* was off Saldanha Bay. Ovigerous ♀♀ were taken mostly in March and April, but also in September.

Twelve specimens from off Cape Hangklip, 50 fathoms, are interesting because of their small size: ♂ (with appendix masculina as well as appendix interna) 27 mm., and ovig. ♀♀ 24–28 mm. They do not appear to differ in any other respect from the larger specimens.

They were taken in October, and the s.s. *Pieter Faure* log-book records the eggs as being green.

Parasites.—Two specimens of the Saldanha Bay lot have each a parasite of the genus *Faba* attached to the 1st abdominal sternite. The external part of the parasite is in the one case oval (2·5 mm. long), in the other kidney-shaped (7 mm. long); they are both attached by a four-pronged anchor embedded in the abdominal muscles of the host (fig. 128, *g*). (See Nierstrasz and Brandis, Proc. U.S. Nat. Mus., lxxvii, Art. 9, p. 1, 1930.) The systematic position of these parasites is doubtful, but provisionally they have been regarded as Epicaridean Isopods (see also *Leontocaris*).

Merhippolyte calmani Kemp & Sewell

Fig. 128, *h*.

1912. Kemp and Sewell, *l. c.*, p. 20, pl. 1, figs. 1–4.
1914. Kemp, *l. c.*, p. 88.
1939. Calman, John Murray Exp., vi, p. 209.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 385.

Carapace smooth, no supra-orbital spine, antero-inferior corner subrectangular; 2 dorsal teeth behind orbit on post-rostral keel which is feeble and does not extend to hind margin, and one tooth on base of rostrum which is longer than carapace, curved upwards and rather deep proximally, dorsal margin in front of basal tooth quite smooth; lower margin with 9 (or 10) teeth, the proximal ones close together. Abdominal segments not keeled dorsally, 6th segment twice length of 5th in ♂, a little more in ♀; postero-inferior angle of 4th segment rounded, of 5th acute; 1st and 2nd sternites each with a pair of denticles in ♂, smooth in ♀. Telson subequal to 6th segment, with 2 pairs of dorso-lateral spinules. Cornea large, width equal to $\frac{1}{4}$ length of carapace (excl. rostrum), no ocellus. Lower margin of 2nd and 3rd joints of 1st leg not produced; inner surface of 5th joint (wrist) with a pit surrounded by strongly ctenate spines in both sexes. 2nd leg extending a little beyond apex of antennal scale (by about the length of its chela). Epipods on legs 1–4. Endopod of pleopod 1 ♂ as in *agulhasensis*.

Length (tip of telson to orbit) ♂ 60 mm., rostrum 22 mm.; ♀ 55 mm. (to orbit, rostrum broken). Red (s.s. *Pieter Faure* log-book).

Locality.—Off Cape Morgan, 250–320 fathoms (S. Afr. Mus.).

Distribution.—Indian Ocean (9° 14′ N., 75° 45′ E.), 237 fathoms; Maldives, 494 metres.

Remarks.—One ♂ and one ovig. ♀ were preserved as "samples" out of some 200 specimens (*fide* log-book) collected at the above locality by the s.s. *Pieter Faure.* Kemp and Sewell's original 2 specimens were both ♀♀, and smaller than the present specimens; Calman's 2 specimens were also ♀♀.

Gen. Alope White

1919. Stebbing, Ann. Durban Mus., ii, p. 121 (references).

1947. Holthuis, *l. c.*, p. 7.

No arthrobranchs on legs. Mandible with incisor process (in the genotype) or without (as in *australis*), with 3-jointed palp. Wrist of 2nd leg with 6–8 jointlets. Mxp. 3 with small exopod. Carapace smooth, supra-orbital spine large. No movable tooth at base of uropod. First leg and 3rd–5th legs rather stout.

Remarks.—Two species; the genotype is restricted to New Zealand.

Alope orientalis (de Man)

Fig. 129, *a*.

1890. de Man, Notes Leyden Mus., xii, p. 122, pl. 6, fig. 16 (*Hetairocaris o.*).

1919. Stebbing, *l. c.*, p. 121, pl. 19 (*australis*).

1921. *Id.*, Ann. Durban Mus., iii, p. 22, fig. 5 (mandible) (*australis*).

1927. Hale, Crust. S. Austral., pt. 1, p. 49, fig. 41 (*australis*).

1947. Holthuis, *l. c.*, p. 33.

Rostrum with (4) 5 dorsal teeth, 2 being post-orbital, no ventral teeth, tip not teaching end of basal joint of ant. 1; supra-orbital spine reaching to base of enlarged portion of eye-stalk. Lateral process of basal joint of ant. 1 not reaching far beyond apex of joint, usually distinctly shorter. A strong tooth-like projection between bases of 3rd and 4th legs, its hinder end flanked on each side by a setiferous spine; a forwardly directed bifurcate process between bases of 5th legs, much less developed in ♀ than in ♂. Abdominal segments dorsally rounded. Peduncles of pleopods L-shaped in cross-section (as in *Saron*); endopod of pleopod 1 in ♀ much larger than exopod, in ♂ slightly larger, with apex unequally bifid; appendix interna on pleopods 2–5 in both sexes, also appendix masculina on pleopod 2 ♂, pleopod 5 taking part in closing the brood chamber in ♀.

Length ovig. ♀ 24–32 mm. Pale greyish or creamy-white, with

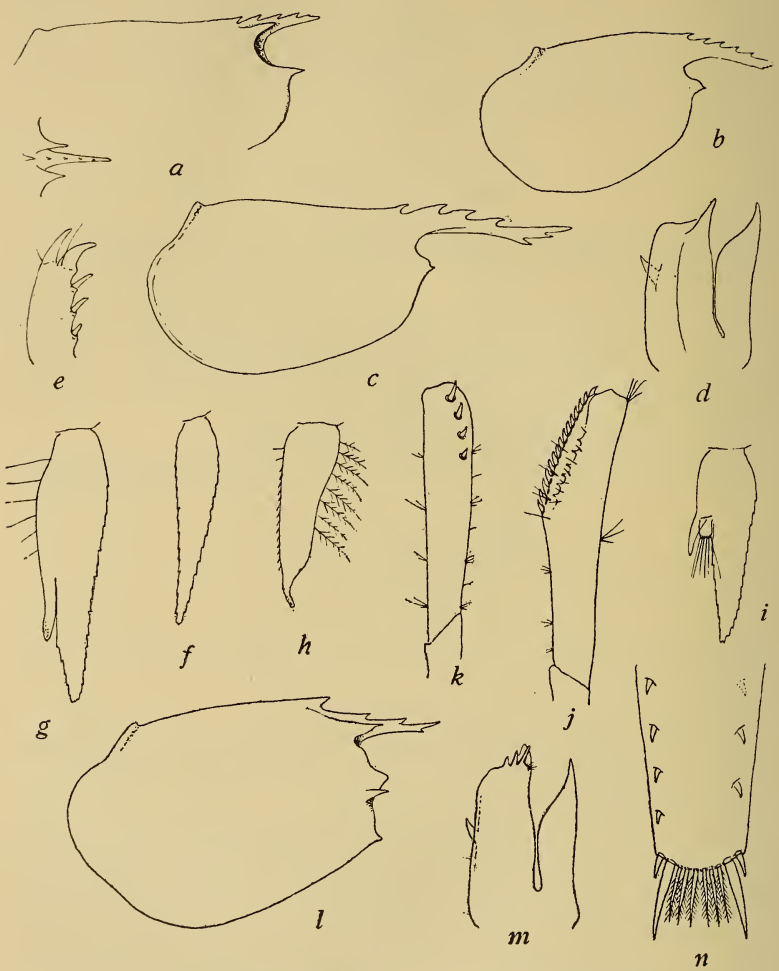


Fig. 129.—*Alope orientalis* (de Man). *a*, carapace, with dorsal view of base of rostrum.

Spirontocaris pax Stebb. *b*, carapace of allotype, False Bay.

Spirontocaris ctenifera n. sp. *c*, carapace. *d*, basal joint of ant. 1. *e*, dactyl of 3rd–5th legs. *f*, endopod of pleopod 1 ♀, setae omitted. *g*, endopod of pleopod 2 ♀, setae partly omitted. *h*, endopod of pleopod 1 ♂. *i*, endopod of pleopod 2 ♂, setae on endopod omitted. *j*, inner view of 4th joint of 3rd and 4th legs ♂. *k*, outer view of the same, ♀.

Spirontocaris saldanhae Brnrd. *l*, carapace. *m*, basal joint of ant. 1. *n*, telson, proximal spine on right side apparently torn out.

small red or brown spots nearly uniformly distributed, antennae white, legs banded with red, eyes black.

Localities.—Isezela, Natal (Stebbing); Durban (S. Afr. Mus.); Port St. Johns (coll. T. A. Stephenson); Impengazi, north of St. Lucia Bay (Coll. T. A. Stephenson).

Distribution.—Burma; Caroline Is.; west, south, and south-east Australia.

Remarks.—Stebbing's 1921 suggestion that a 5-dentate plate on the molar may be the incisor process is scarcely acceptable, as this process is on the innermost edge of the obliquely truncate apex of the mandible, not on the outermost edge (and nearest the palp) where the incisor process should be, and where there is in fact a small tubercle, not represented in Stebbing's figure.

Gen. Spirontocaris Bate

1904. Rathbun, Harriman Alaska Exp., x, p. 56.

1914. Kemp, Rec. Ind. Mus., x, p. 93, and p. 123 (Indo-Pacific species listed).

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 91 (references).

1921. *Id.*, Ann. Durban Mus., iii, p. 19.

1936. Lebour, Proc. Zool. Soc. Lond., i, p. 89 (generic characters).

1940. *Id.*, J. Mar. Biol. Assoc. Plym., xxiv, p. 505 (larval stages).

1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 267.

1947. Holthuis, *l. c.*, pp. 7, 36 (sens. strict.).

No arthrobranchs on legs. Mandible with incisor process usually small or reduced, palp 2-jointed. Wrist of 2nd leg with 6–7 jointlets. Mxp. 3 with or without exopod. Rostrum long or short, shallow or deep; supra-orbital spine, when present, not large. Telson with 4–6 pairs of dorso-lateral spinules. Gills 6 plus 4–6 epipods.

Remarks.—Holthuis agrees with certain Russian authors in dividing this genus into *Spirontocaris* s.s., *Eualus*, *Lebbeus*, and *Birula*. *Spirontocaris* s.s. has 2–4 supra-orbital spines; consequently the South African species are more strictly referable to *Eualus* and *Lebbeus*. Without expressing an opinion on this division, for which in practice there appears to be much to be said, I retain *Spirontocaris* sensu lato.

Key to the South African Species.

1. Without supra-orbital spine. Mxp. 3 with exopod . . (*Eualus*).
   a. Rostrum with 2 teeth ventrally.
      i. Basal joint of ant. 1 without tooth on lower inner margin. Epipods on 1st and 2nd legs . . *pax*.

ii. Basal joint of ant. 1 with tooth on lower inner margin (fig. 129, *d*). Epipods on 1st–3rd legs . *ctenifera.*
b. Rostrum smooth ventrally . . . . . *makrognathus.*
2. With 1 supra-orbital spine on each side. Mxp. 3 without exopod (*Lebbeus*) . . . . . *saldanhae.*

Spirontocaris pax Stebb.

Fig. 129, *b.*

1915. Stebbing, *l. c.*, p. 91, pl. 24 (Crust., pl. 88).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 24.

Rostrum short, shallow, with 4 teeth above and 2 below in the type, 5 and 3 resp. in the allotype (Odhner also: 5 above). Carapace deep, antennal tooth well developed, no supra-orbital spine. Incisor process of mandible well developed. Abdomen dorsally rounded, 3rd segment not acutely produced. Epipod and small exopod on mxp. 3. Epipods on 1st and 2nd legs. Wrist of 2nd leg with 6 jointlets (in allotype basal jointlet obscurely divided). Legs 3–5 with apex of 5th joint overlapping base of 6th, dactyl with apical spine as well as unguis (or the distal spine much shorter than unguis). Telson in allotype with 4 pairs of dorso-lateral spinules (type: 6 on one side, 3 on the other).

Length ♀ 14·5 mm. (carapace 4 mm.); Odhner's ♀ 16 mm.

Localities.—False Bay, 20 and 30 fathoms (Stebbing); off Cape Barracouda, 72 metres (Odhner).

Remarks.—The type, probably dissected and mounted on a slide, is not in the South African Museum. I have seen only the allotype, an ovig. ♀, from which the number of epipods, not mentioned by Stebbing, has been determined. The mandible of the allotype resembles Stebbing's figure.

Spirontocaris ctenifera n. sp.

Fig. 129, *c–k.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 385 (cf. *pectinifera* Stmpsn.).

Carapace with antero-lateral corner rounded, no supra-orbital tooth, one post-orbital tooth, rostrum shorter than rest of carapace, straight, with 3 teeth above and 2 below. Lateral process of basal joint of ant. 1 as long as 1st joint, latter with strong tooth on lower inner margin, outer apices of 1st and 2nd joints and upper apex of 3rd joint

each with a spine. Mandible with small 2-jointed palp. Mxp. 3 not (proportionately) larger in ♂ than in ♀, with exopod and epipod, exopod about half length of the antepenultimate joint. Finger and thumb of 1st chela nearly meeting throughout their length. Wrist of 2nd leg with 7 jointlets. 4th joint of 3rd and 4th legs in ♂ somewhat fusiformly expanded, with a comb-like series of close-set short stout spines on distal half of lower outer (posterior) margin, and on the inner surface with a series of small papilla-like denticles; in ♀ not expanded, with 4 graduated stout spines distally on outer (posterior) surface; 4th joint in 5th leg without spines. Dactyls of 3rd–5th legs with 4 spines in addition to unguis, the most distal one stouter than the unguis. Epipods (mastigobranchs) on 1st, 2nd, and 3rd legs (and setobranch on 4th leg). Appendix interna on pleopods 2–5 in ♀ arising about midway along endopod; appendix masculina on pleopod 2 ♂ very short, with long setae on truncate apex; endopod of pleopod 1 ♂ lanceolate, with spaced plumose setae on inner margin, small spinules on outer margin, and coupling-hooks on the narrowed apex. Telson with 4 pairs of dorso-lateral spinules, 3 unequal pairs on apex.

Length ♀ up to 14 mm., ♂ smaller.

Localities.—Algoa Bay (S. Afr. Mus. 2 ovig., 2 non-ovig. ♀♀, 2 ♂♂); Durban (S. Afr. Mus. 1 ovig. ♀).

Remarks.—These small specimens were at once conspicuous for the remarkable comb-like structure on the 3rd and 4th legs of the ♂, similar to that of *cranchii* and *occulta* (see Lebour, *l. c.*, 1936, pp. 93, 96, pl. 5, figs. 1–6). They differ from *occulta* in having an epipod (mastigobranch) on 3rd leg and setobranch on 4th leg, and 2 ventral teeth on rostrum.

These specimens were (1947) provisionally assigned to *pectinifera* Stmpsn. on the assumption that the specific name referred to the pectination on the 4th joint of 3rd and 4th legs. Neither Stimpson's (1860, Proc. Ac. Nat. Sci. Philad., p. 35) nor Balss' (1914, Abh. Bayer. Ak. Wiss., II Suppl. Bd., pt. 2, p. 42) papers were available. From Holthuis' Siboga Report (p. 37), however, it appears that *pectinifera* is a species of *Spirontocaris* s.s. with supra-orbital spines, and that the specific name refers to the pectinate lateral margins of the abdominal pleurae.

From Rathbun's synopsis (1904, Harriman Alaska Exp., x, p. 60) the only species with which the present specimens are comparable are *pusiola*, *herdmani*, *stoneyi*, *avina*, and *macilenta*. The shape of the rostrum excludes the last three; *herdmani* is known from the west

coast of North America, but *pusiola* is a North Atlantic species recorded as far south as Spain.

No description of *pusiola* is available to me, and Lebour did not compare *occulta* with *pusiola*. I therefore describe these specimens as a new species. Perhaps further material will show that it is synonymous with *makrognathus*, inadequately described from a single ♀ which may possibly have been abnormal in having no ventral teeth on the rostrum. The armature of the telson, however, differs.

The ovig. ♀ from Durban has 4 dorsal teeth on rostrum (in addition to the post-rostral one). Otherwise it agrees with the other specimens. One ovig. ♀ from the Natal coast, 40 fathoms, has rostral formula $\frac{4}{1}$, one of the dorsal teeth post-rostral, no supra-orbital tooth, wrist of 2nd leg with 6 jointlets, and other characters as given above.

Spirontocaris makrognathus Stebb.

1921. Stebbing, *l. c.*, p. 19, pl. 4.

Rostrum short, shallow, with 5 teeth dorsally, smooth ventrally, no supra-orbital tooth. Mandible with palp (? 2-jointed), incisor process ?. Mxp. 3 with small exopod, ? epipod. Epipods on legs ?, wrist of 2nd leg with 7 jointlets. Dactyls of legs 3–5 with unguis only. Telson with 2 pairs of dorso-lateral spinules, and only 1 pair of small apical spines.

Length of carapace 13 mm.

Locality.—Durban (Stebbing).

Spirontocaris saldanhae Brnrd.

Fig. 129, *l–n*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 385.

♀. Carapace with small point at antero-inferior corner; supra-orbital tooth strong; one post-rostral tooth, preceded by 2 on the short shallow rostrum, which reaches to end of eyes and about half-way along antennal scale; apex acute, one ventral tooth a little distance from it. Lateral process of basal joint of ant. 1 as long as basal joint, latter with 3 spines on upper distal margin, and a tooth on lower inner margin; outer apices of 2nd and 3rd joints each with a spine; outer flagellum stout, setose. Mandible with 2-jointed palp. Mxp. 3 extending well beyond end of antennal scale, without exopod, with epipod. 1st leg extending to or slightly beyond end of antennal scale, finger and thumb meeting throughout their length. Wrist of 2nd leg

with 7 jointlets. 4th joint of 3rd–5th legs without spines; apex of 6th joint of 5th leg with brush of spines; dactyls with 6 spines, the apical one not stouter than unguis. Epipods (mastigobranchs) on 1st–3rd legs, setobranch on 4th leg. Telson with 4 spines on left, and 2 (3) on right side, a short and a long spine at each corner, apical margin evenly convex, with 6 plumose spines between, and shorter than, the large lateral ones.

Length 23 mm.

Locality.—Off Constable Hill, Saldanha Bay, 145 fathoms (S. Afr. Mus).

Remarks.—Differs from *occulta* Lebour 1936 (which has 7 jointlets in wrist of 2nd leg) in having a supra-orbital tooth and a mastigobranch on 3rd leg (with setobranch on 4th), as well as its larger size. The telson also is unusual.

Appears to belong to *Lebbeus* White, if this genus is separated from *Spirontocaris* s. l., and to the third group of species mentioned by Holthuis (1947, *l. c.*, p. 38).

Gen. Leontocaris Stebb.

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 98.

1910. *Id.*, *l. c.*, p. 391.

No arthrobranchs on legs. Mandible with incisor process and small 1-jointed palp. Mxp. 3 without exopod or epipod. Epipods present only on mxp. 1 and 2. Rostrum long. No supra-orbital spine. 1st legs very slender, 5th joint elongate. 2nd legs strongly asymmetrical, in one of them the 6th joint elongate and robust, dactyl enlarged, chopper-shaped, wrist in both with 4-jointlets. Gills 6 plus 2 epipods.

Remarks.—One species in South Africa, one species in the Irish Sea.

Leontocaris paulsoni Stebb.

Fig. 130, *a–c.*

1905. Stebbing, *l. c.*, p. 99, pl. 26.

1910. *Id.*, *l. c.*, p. 391.

Carapace smooth, with sharp antennular angle and a conspicuous buttressed antennal spine; dorsally 6 teeth, of which 2 post-rostral and separated by a distinct gap from the 4 rostral ones, apex of rostrum tridentate, 6–8 teeth on ventral margin. Abdominal segments

dorsally rounded, 3rd produced in a sharp downwardly curved tooth; segments 5 and 6 each with a spiniform tooth above the rounded postero-inferior corner. Telson rather flattened, with 7 pairs of lateral

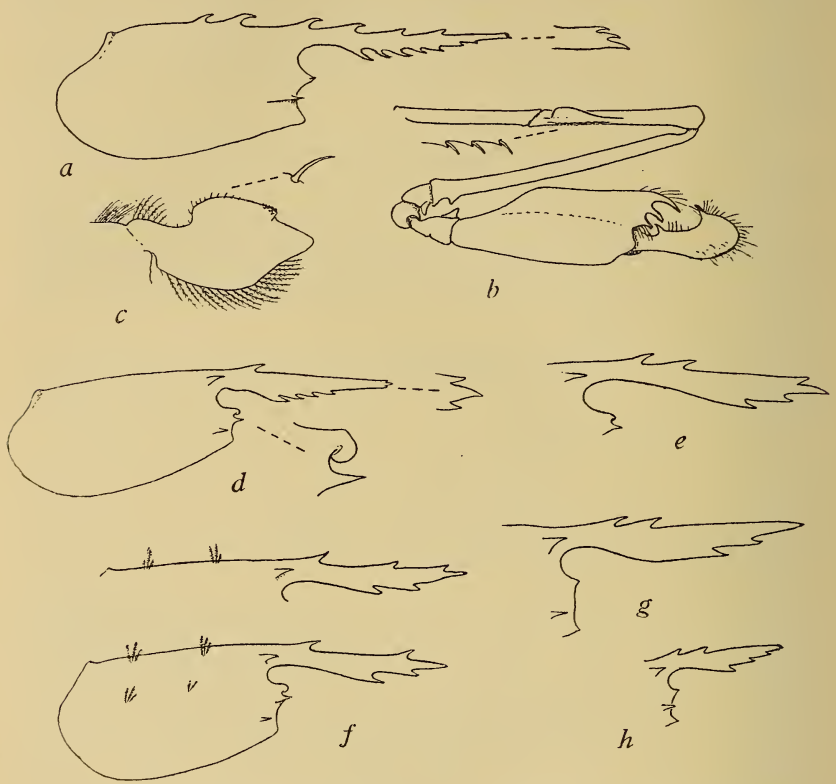


Fig. 130.—*Leontocaris paulsoni* Stebb. *a*, carapace, with tip of rostrum further enlarged. *b*, inner view of 2nd leg (3rd joint onwards). *c*, endopod of pleopod 1 ♂.
Hippolyte kraussiana (Stimpson). *d*, carapace with apex of rostrum and sub-orbital process further enlarged (Knysna). *e*, rostrum of juv. 13 mm. long (Knysna). *f*, carapace (Still Bay), with dorsal profile and rostrum of a Knysna specimen.
Hippolyte ventricosa M. Edw. *g*, rostrum, after Kemp. *h*, rostrum, after Hilgendorf (*mossambicus*).

spinules, and an apical pair. Cornea small, not wider than stalk. Outer margin of antennal scale serrate in distal half, apical spine scarcely extending as far as lameller tip. Mxp. 2 with lobate epipod (cf. *L. lar* Kemp, 1910, p. 114). Second pair of legs asymmetrical, the enlarged one being either the right or the left (48 and 52 per cent. resp.), the normal-shaped one with 4th joint only a little

longer than 3rd (Stebbing's figure is not quite accurate, as Kemp 1910 suggested); 4th joint of the enlarged leg with a keel and some fine serrations on inner surface proximally (Stebbing said "grooved"), 6th joint folding internally (medianly) to the long basal jointlet of 5th joint, its upper margin keel-like, ending in the 3-pronged thumb, finger chopper- (or bill-hook) shaped. Dactyl of 3rd–5th legs short (scarcely, as Stebbing said, "very small"), curved, setose. Pleopod 1 ♂ with endopod broadly oval, excavate proximally on inner margin, which is bordered with simple spine-setae, and farther distally a group of coupling-hooks. Outer margin of outer ramus of uropod serrate in distal half.

Length up to 46 mm. Smallest ovig. ♀ 28 mm. Pink or reddish.

Localities.—Off Cape Peninsula, 131 fathoms (Stebbing); off Cape Peninsula and off Saldanha Bay, 131–145 fathoms (S. Afr. Mus.).

Remarks.—Ovigerous ♀♀ were caught in March and April.

The epipod on mxp. 2, which Stebbing did not mention, is much more lobate than in Kemp's figure of *lar* (1910, pl. 17, fig. 8), and, as Kemp suggested, probably forms a functional podobranch.

Parasites.—Two of the specimens caught off Saldanha Bay carry parasites of the genus *Faba*, like those found on *Merhippolyte agulhasensis* (*q.v.*); one of the specimens has one parasite attached to the 1st abdominal sternite, the other has two parasites attached to the body-wall (both on same side) above the gills within the branchial cavity.

Gen. Hippolyte Leach

1910. Kemp, Fish. Irel. Sci. Invest. [1908], i, p. 100.

1910, Stebbing, *l. c.*, p. 390.

1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 289.

1914. Kemp, Rec. Ind. Mus., x, p. 95, and p. 125 (Indo-Pacific species).

1936. Gurney, Proc. Zool. Soc. Lond., i, p. 25.

1947. Holthuis, *l. c.*, pp. 14, 53.

No arthrobranchs on legs. Mandible with incisor process and molar, but no palp. Mxp. 3 with exopod, but no epipod. Epipods present on mxp. 1 and 2 only. Rostrum long. Supra-orbital spine present. Lateral process of basal joint of ant. 1 acute; 3rd peduncular joint normal (*i.e.* without movable plate). Chela of 1st leg rather short and stout. Wrist of 2nd legs with 3 jointlets. 3rd–5th legs in ♂ subprehensile, the 6th joint expanded in the middle. Telson with 2 pairs of dorso-lateral spinules. Gills 5 plus 2 epipods.

Key to the South African Species.

1. Apex of rostrum tridentate . . . . . *kraussiana.*
2. Apex of rostrum acuminate . . . . . *ventricosa.*

Hippolyte kraussiana (Stimpson)

Fig. 130, *d–f.*

? 1843. Krauss, Südafrik. Crust., p. 56 (*ensifera*, non M. Edw.).

1910. Stebbing, *l. c.*, pp. 390 (*ensifera*), 391.

1914. Lenz in Lenz and Strunck, D. Südpol Exp., xv, p. 319, pl. 20, figs. 1–4 (*Virbius capensis*).

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 89 (*kraussianus*).

Carapace smooth, glabrous, supra-orbital tooth strong, suborbital margin produced in a rounded knob above the antennal tooth, a conspicuous submarginal pterygostomial tooth; rostrum in adult reaching to end of antennal scale, with 1 or 2 teeth above proximally, 4 or 5 teeth below, and a tridentate apex; in juv. reaching not quite to end of scale, with 2 teeth above and 1 below, with tridentate apex (Stebbing did not mention the number of dorsal teeth in 13 mm. juv., but his specimen and another of same size both have 2). Abdominal segments dorsally rounded, 3rd segment distinctly gibbous but not produced, 6th segment $1\frac{1}{2}$ times as long as deep; a small tuft of setae just in front of the rounded-quadrate postero-inferior corner of 5th segment (if setae matted together they may look like a spine). Telson with 2 pairs of dorso-lateral spinules, and 3 graduated pairs on truncate apex. Lateral process of basal joint of ant. 1 extending to end of basal joint, which has no outer distal spine; outer flagellum with 10–12 thick joints and 2 slender distal joints. Antennal scale about $3\frac{1}{2}$ times as long as broad, lamellar apex reaching far beyond spine on outer margin. Wrist of 2nd leg with 1st jointlet equal to 2nd plus 3rd (Stebbing), but usually 1st and 3rd subequal, 2nd shorter, distinctly longer than broad. 3rd–5th legs decreasing in length, in adult the *posterior* surface of 4th joint on 3rd and 4th legs with 4 (3–5) stout spines, on 5th leg with 1 distally, 5th joint in all three legs with 1 spine proximally; dactyl with 8–9 spines (5–6 in juv.) on inner margin in addition to the apical spine and unguis. Adult ♂ not seen.

Length up to 32 mm.

Localities.—Simon's Bay (Stimpson; Lenz); Knysna and East London (Stebbing); Still Bay (S. Afr. Mus.); False Bay (Univ. Cape Town Ecolog. Surv.).

Remarks.—The above description is based on 7 specimens (2 returned by Stebbing).

Although there is little doubt that *V. capensis* Lenz is the same species, Lenz said the "lower orbital margin" was produced in a tooth as in *H. varians*; but his figure shows only a single tooth, whereas in *varians* (Kemp, *l. c.*, 1910, pl. 13, fig. 1) there are 2 *sharp* teeth, the upper one corresponding with the distinctive *rounded* process of the present specimens.

Neither Stebbing nor Lenz refer to the stout spines on the 4th (and 5th) joints of 3rd–5th legs. As these are inserted on the flat surface, not on the margin of the limb (as it usually lies when detached from the animal), they are easily overlooked unless the limb be turned to get a surface view. I could not trace them in the two juveniles (13 mm.), so possibly Lenz's single specimen was also young.

The identity of Krauss' specimens is beyond conjecture; if they are still in existence they should be re-examined. *H. ensiferus* M. Edw. is the genotype of *Latreutes* (*v. infra*).

There are also in the South African Museum 20 specimens from Still Bay, mostly ovig. ♀♀. The largest ovig. ♀ is only 18 mm. in length. The rostral formula varies, *e.g.* $\frac{2}{0}$, $\frac{1}{1}$, $\frac{2}{2}$ (8 specimens), $\frac{2}{6}$, $\frac{4}{4}$ etc. The number of specimens with dorsal teeth 1, 2, 3, 4 is resp. 1, 15, 3, 1; and that of specimens with ventral teeth 0, 1, 2, 3, 4, 5, 6 is resp. 1, 3, 9, 5, 1, 1, 1. Other characters are in agreement with the above description of *kraussiana*, including the spines on 4th and 5th joints of 3rd–5th legs; the proportions of the jointlets in the wrist of 2nd leg are, mostly, as given by Stebbing (1st ≡ 2rd + 3rd).

In two respects, however, these specimens differ. The lateral process of basal joint of ant. 1 extends only half-way, or at most $\frac{2}{3}$, along the basal joint; outer flagellum with 6–8 thick and 2–3 thin joints. There are little tufts of 2–3 plumose setae on the carapace and abdomen; they vary in position, but usually there are 2 dorso-lateral pairs and 1 lateral pair on carapace (fig. 130,*f*), and dorso-lateral pairs on each abdominal segment, also ventro-laterally on 5th segment, a median tuft at base of telson, and one at its apex.

Such plumose setae are figured by Paulson (Red Sea Crust., pl. 18, fig. 1) for his *Virbius proteus* (? = *H. orientalis* Heller; see Kemp, *l. c.*, p. 97, and Gurney, Trans. Zool. Soc. Lond., 1927, p. 394). Where present they are very conspicuous, and one would have expected Stebbing, or Lenz, or Kemp (1914, for *ventricosa*) to have remarked upon them.

It would appear, however, that they cannot be used as a specific

character. The above described specimens from Knysna showed no traces of them, even on 5th abdominal segment where they might perhaps have escaped abrasion. On the other hand, two specimens recently received from Knysna (amongst Zostera, green when alive) have plumose setae on the carapace, and a short basal process on ant. 1.

Lastly, I have seen a few specimens, collected by the University of Cape Town Ecological Survey in False Bay (near Stimpson's locality), with moderately short basal process of ant. 1, and the smaller number of thick joints in outer flagellum (8, sometimes 9), some of which (♀♀) have the tufts of plumose setae and some (♀♀ and ♂♂) have not. The rostrum has 2 basal dorsal teeth as described by Stimpson (*cf.* fig. 130, *e*).

Evidently far more material of these small shrimps is required, as Kemp says, before the species can be satisfactorily defined.

It may be noted that *proteus* also has a short basal process on ant. 1.

Hippolyte ventricosa M. Edw.

Fig. 130, *g*, *h*.

1837. Milne Edwards, Hist. Nat. Crust., ii, p. 371.

1861. Heller, SB. Ak. Wiss. Wien, xliii, p. 277 (*orientalis*).

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 836, pl. 4, fig. 1 (*Virbius mossambicus*).

1914. Kemp, *l. c.*, p. 96, pl. 2, figs. 1–3 (*ventricosus*).

1916. *Id.*, Rec. Ind. Mus., xii, p. 391.

1927. Gurney, Trans. Zool. Soc. Lond., xxii, p. 391, figs. 94, 95 (rostrum, ant. 1).

1947. Holthuis, *l. c.*, p. 55, figs. 7–9.

Rostrum with 1 or 2 dorsal teeth, 2–3 ventral teeth, apex acuminate. Suborbital margin produced above the antennal spine in Holthuis' figure, but seemingly not so in Kemp's figure. 3rd abdominal segment gibbous but not produced, 6th segment $1\frac{1}{2}$ times as long as deep. Antennal scale not more than 3 times as long as wide (Kemp). 1st joint of ant. 1 with outer distal spine; outer flagellum with 11 thick joints, 6 slender joints. Wrist of 2nd leg with 1st jointlet the longest, 2nd as broad as long, 3rd not as long as 1st (Kemp) or almost as long (Hilgendorf); dactylus of 3rd leg with 16 spines. Telson with 8 apical spines.

Length up to 24 mm.

Locality.—Zambesi (Hilgendorf).

Distribution.—Red Sea, Southern India and Andaman Is., East Indies; Suez Canal; Australia.

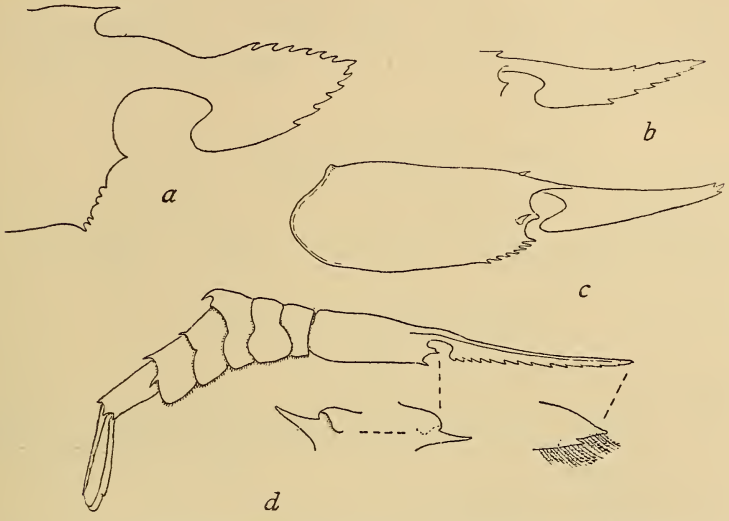


Fig. 131.—*Latreutes mucronatus* (Stimpson). *a*, anterior part of carapace, with rostrum, ♀, after Lenz (*natalensis*). *b*, rostrum of ♂, after Kemp.
Latreutes pygmaeus Nob. *c*, carapace of ♀.
Angasia armata (Paulson). *d*, whole animal ♀, with apex of rostrum, and outer and inner views of suborbital process further enlarged.

Remarks.—Kemp identified Hilgendorf's species with M. Edwards'. The locality is probably near the mouth of the river.

Kemp's figure shows no projection of the suborbital margin above the antennal spine; Hilgendorf's figure is too small to be reliable.

Gen. Latreutes Stimpson

1914. Kemp, Rec. Ind. Mus., x, p. 98, and p. 125 (list of Indo-Pacific species).

1916. *Id.*, *ibid.*, xii, p. 396.

1936. Gurney, Proc. Zool. Soc. Lond., 1935, pt. 4, p. 792, pl. 6, figs. 37–41 (larval form).

1937. *Id.*, "Discovery" Rep., xiv, p. 398 (larval form).

1947. Holthuis, *l. c.*, pp. 16, 59.

No arthrobranchs on legs. Mandible without incisor process and without palp. Mxp. 3 with exopod. Epipods present on at least the first 3 pairs of legs. Rostrum rather long, usually deep, often very

deep, especially in ♀, with a "heel" posteriorly. No supra-orbital spine. Antero-lateral margin of carapace serrate. Lateral process of basal joint of ant. 1 anteriorly rounded. Wrist of 2nd leg with 3 jointlets.

Remarks.—The species are mostly based on the character of the rostrum, which, however, is even more variable than in *Hippolyte* or *Spirontocaris* (Kemp).

Key to the South African Species.

1. Body stout. 2nd legs reaching beyond eyes to apex of rostrum . . . . . *mucronatus.*
2. Body very slender. 2nd legs not reaching end of eyes . *pygmaeus.*

Latreutes mucronatus (Stimpson)

Fig. 131, *a*, *b*.

1914. Kemp, *l. c.*, p. 101, pl. 3, figs. 8–15, pl. 4, figs. 1, 2 (synonymy).

1914. Lenz in Lenz and Strunck, D. Südpol Exp., xv, p. 320, pl. 21, figs. 1–11 (*natalensis*).

1916. Kemp, *l. c.*, p. 396.

1921. Balss, K. Sv. Vet. Ak. Handl., lxi, no. 10, p. 10.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 385.

Body rather stout. Carapace smooth with 1 post-rostral fixed tooth (rarely 3–4). Rostrum (measured from hind margin of orbit) 1½–2 times as long as greatest depth in ♀, 2½–4 times in ♂; dorsal teeth 7–15 in ♀, 4–8 in ♂, ventral teeth 4–15 in ♀, 0–9 in ♂ (Kemp); antero-lateral margin of carapace with 11–14 serrations in ♀, 6–7 in ♂. Upper flagellum of ant. 1 longer and thicker in ♂ than in ♀, 1st peduncular joint twice as long as wide. Antennal scale narrower proportionately to length in ♂ than in ♀, but not more than 4½ times as long as wide. 2nd legs reaching about to end of rostrum, wrist with 1st and 3rd jointlets subequal, each about half length of 2nd. Dactyls of 3rd–5th legs spinose on inner margin. Epipods on first 4 legs (Kemp, pl. 4, fig. 1). Telson with 2 pairs of dorsal spinules, and 2 unequal spines on either side of the abruptly narrowed apex.

Length up to 135 mm.

Locality.—Durban, surface (Lenz).

Distribution.—Red Sea, south-east coast of Arabia, Southern India, Andaman Is., East Indies, N.W. Australia, China and Japan.

Remarks.—In view of Kemp's demonstration of the variability of this species, I consider *natalensis* Lenz an obvious synonym.

Latreutes pygmaeus Nob.

Fig. 131, *c*.

1904. Nobili, Bull. Mus. d'Hist. Nat. Paris, p. 230.

1906. *Id.*, Bull. Sci. Fr. Belg., xl, p. 37, pl. 3, fig. 4, *a–h*.

1914. Kemp, *l. c.*, p. 99, pl. 2, figs. 7, 8, pl. 3, figs. 1–7.

1916. *Id.*, *l. c.*, p. 396.

1921. Balss, K. Sv. Vet. Ak. Handl., lxi, no. 10, p. 10.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 385.

Body very slender. Carapace with 1 movable post-rostral spine; antero-lateral margin with 4–6 or 7 serrations; a movable spine behind the orbital tooth. Rostrum with tridentate apex; according to Kemp either wholly unarmed, or with 1–3 dorsal and 1–3 ventral denticles, all in the distal third. Basal joint of ant. 1 three times as long as wide. Antennal scale very narrow, at least six times as long as wide. 2nd legs not reaching to end of eyes; middle jointlet of wrist the longest, 3rd the shortest. Dactyls of 3rd–5th legs spinose on inner margin. Epipods on first 4 legs. Telson as in *mucronatus*.

Length up to 22 mm.

Locality.—Delagoa Bay (coll. C. J. van der Horst, 1933, 1 ovig. ♀).

Distribution.—Red Sea, south-east coast of Arabia, Southern India, Andaman Is., N.W. Australia.

Remarks.—The movable spine behind the orbital tooth is not represented in Kemp's figure; it is not mentioned in Nobili's original diagnosis (1904), but I have not seen his two 1906 papers. In other respects there is complete agreement between the present specimen and the description.

Gen. Angasia Bate

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 26 (*Tozeuma* [sic], etym. τοξευμα).

1864. Bate, Proc. Zool. Soc. Lond., 1863, p. 498 (*Angasia*) (date of public.: *fide* Neave's Nomenclator).

1904. Baker, Trans. Roy. Soc. S. Austral., xxviii, p. 147 (*Angasia*).

1914. Kemp, Rec. Ind. Mus., x, p. 105, and p. 126 (list of Indo-Pacific species) (*Tozeuma*).

1927. Stephensen, Vid. Medd. Dansk naturf. For., lxxxiii, p. 296 (key to species) (*Tozeuma*).

1927. Hale, S. Austral. Crust., pt. i, p. 52 (*Tozeuma*).

1937. Gurney, "Discovery" Rep., xiv, p. 377 (*Tozeuma*, larval stages).

1947. Holthuis, *l. c.*, pp. 17, 61.

No arthrobranchs on legs. Mandible without incisor process, without palp. Mxp. 3 without exopod. No epipods on legs. Body slender. Rostrum elongate. No supra-orbital spine (according to Nobili *erythraeum* has one); antennal spine present and antero-lateral angle of carapace spiniform. Lateral process of basal joint of ant. 1 acute; upper flagellum uniramous. Wrist of 2nd leg with 3 jointlets.

Remarks.—It would seem that, because Stimpson unfortunately gave the derivation of his generic name, the spelling *Tozeuma* must be regarded as a printer's error; the correct spelling should have been *Toxeuma*. And, as Henderson and Kemp point out, this means the adoption of Bate's generic name, as *Toxeuma* is preoccupied by Walker, 1833.

A. pavonina Bate and other South Australian species are very brilliantly coloured.

Angasia armata (Paulson)

Fig. 131, *d*.

1875. Paulson, Red Sea Crust., p. 99, pl. 15, fig. 2, *a–o* (*Tozeuma a.*).

1893. Henderson, Trans. Linn. Soc. Lond., v, p. 437, pl. 40, figs. 18–20 (*A. stimpsonii*).

1906. Nobili, Ann. Sci. Nat. zool. Paris (9), iv, p. 42.

1914. Kemp, *l. c.*, p. 106 (*Tozeuma a.*).

1916. *Id.*, Rec. Ind. Mus., xii, p. 399, fig. 4 (late larval stage) (*Tozeuma a.*)

1917. Borradaile, Trans. Linn. Soc. Lond., 2nd ser. zool., xvii, p. 402 (*Tozeuma a.*).

1927. Stephensen, *l. c.*, p. 297 (*Tozeuma a.*).

1947. Holthuis, *l. c.*, p. 61, figs. 10, 11.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 386.

Rostrum about as long as carapace plus first 3 abdominal segments, smooth above, with 14 (Kemp: 20–24) teeth enveloped in plumose setae on ventral margin. Abdomen strongly bent, 1st and 2nd segments feebly keeled, 3rd strongly keeled and ending in an uncinate tooth, 4th and 5th keeled and ending in acute points, a lateral acute tooth on 5th segment, 6th segment with a medio-dorsal, a lateral, and a postero-inferior tooth. Telson longer than 6th segment, with 3 pairs of dorso-lateral spines, apex subacute (bifid in Paulson's figure). Antennal scale half length of rostrum, 6–7 times as long as wide. Wrist of 2nd leg with 1st jointlet distinctly longer than 3rd, which is a little longer than 2nd. 3rd–5th legs with a slender subapical

spine on lower margin of 4th joint, lower margin of 6th joint with 6–7 spines (each accompanied by a seta or two), dactyls with 4–5 teeth, increasing in size distally.

Length ovig. ♀ (tip of telson to orbit) 42 mm., rostrum 20 mm. (Kemp: 77 mm.).

Locality.—Delagoa Bay (S. Afr. Mus., ex Gilchrist's Survey).

Distribution.—Red Sea, Burma, Andaman Is., Ceylon, Maldives, Seychelles and Cargados Carajos Archipelago; East Indies; Japan.

Gen. Hippolysmata Stimpson

1914. Kemp, Rec. Ind. Mus., x, pp. 112 (key to Indian species), 128 (list of Indo-Pacific species).

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 94 (*Exhippolysmata*).

1916. Kemp, Rec. Ind. Mus., xii, p. 401.

1919. Stebbing, Ann. Durban Mus., ii, p. 119.

1921. *Id., ibid.*, iii, p. 20.

1933. Balss, Mitt. Zool. Mus. Berlin, xix, p. 85.

1935. Gordon, J. Linn. Soc. Lond., xxxix, p. 319 (importance of mouth-parts).

1947. Holthuis, *l. c.*, pp. 19, 67.

No arthrobranchs on legs. Mandible without incisor process or palp. Mxp. 3 with exopod and epipod. Epipods, sometimes rudimentary, on first 4 legs. Rostrum shorter or longer than rest of carapace, slender. No supra-orbital spine, pterygostomial spine present, or reduced, or absent. Lateral process of basal joint of ant. 1 acute; upper flagellum (*i.e.* the shorter, thicker one) uniramous (in *Lysmata* biramous). Wrist of 2nd leg with more than 10 jointlets. Gills 6 plus 2 epipods (4 more or less rudimentary).

Remarks.—Kemp (1916) was disinclined to concede full generic rank to *Exhippolysmata*, and thought that *Lysmatella* Borrad. 1915 should also be included in *Hippolysmata*. Balss (1933) wished to retain *Exhippolysmata* as a genus. Holthuis (1947) adopts the former arrangement.

There is need of much more collecting of these small shrimps and revision of the material. Stebbing described two n. spp. from Natal, but further material seems to show that these two forms differ in exactly the characters which Kemp (1914) pointed out as separating *kükenthali* and *vittata*, and should be identified with these latter species. As regards one of Stebbing's species (*marleyi*) Holthuis has come to the same conclusion.

Key to the South African Species.

1. Rostrum shorter than carapace. Telson apically blunt (*Hippolysmata*).
   a. Antero-lateral angle of carapace with a small spine. Lateral process of basal joint of ant. 1 scarcely half length of basal joint . . . . . *vittata.*
   b. Antero-lateral corner of carapace without spine. Lateral process of basal joint of ant. 1 as long as basal joint . . . . . *kükenthali.*
2. Rostrum longer than carapace. Telson tapering to a fine point (*Exhippolysmata*) . . . . . *tugelae.*

Hippolysmata vittata Stimpson

Fig. 132, *a–c.*

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 26.

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 608, pl. 110, fig. 1 (*Nauticaris unirecedens*).

1907. de Man, Trans. Linn. Soc. Lond. (2), ix, p. 423, pl. 33, figs. 49, 50.

1914. Kemp, *l. c.*, p. 113, pl. 6, figs. 6–10.

1921. Stebbing, *l. c.*, p. 20, pl. 5 (*durbanensis*).

1947. Holthuis, *l. c.*, p. 67.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 386.

Carapace with small spine at antero-lateral corner; one (or 2) post-rostral teeth, the rostrum proper with 5–9 (usually 6–8) teeth above, and 2–6 (usually 4–5) below; rostrum shorter than rest of carapace, nearly straight. Lateral process of basal joint of ant. 1 scarcely half length of basal joint, latter without tooth on lower inner margin. Finger and thumb of 1st chela meeting only at their tips. Wrist of 2nd leg with 15–24 jointlets. 4th joint of 3rd and 4th legs with 4–5 spines on outer (posterior) surface, extending along whole length of joint, of 5th leg without spines. Dactyls of 3rd–5th legs with 2–5 spines in addition to the apical unguis. Apex of telson with 2 unequal pairs of spines (the larger probably broken off in Stebbing's specimen).

Length up to 34 mm. Translucent with narrow longitudinal red stripes on carapace and abdomen, a transverse band on 1st and on 4th abdominal segments dorsally, telson and inner ramus of uropod with red stripes, eggs pale green (Kemp). A specimen in the South African Museum is stated by the collector to have had red longitudinal lines, but no transverse bands.

Locality.—Durban (Stebbing, and S. Afr. Mus.).

Distribution.—Red Sea, Persian Gulf, India, Andaman Is., East Indies, to Japan.

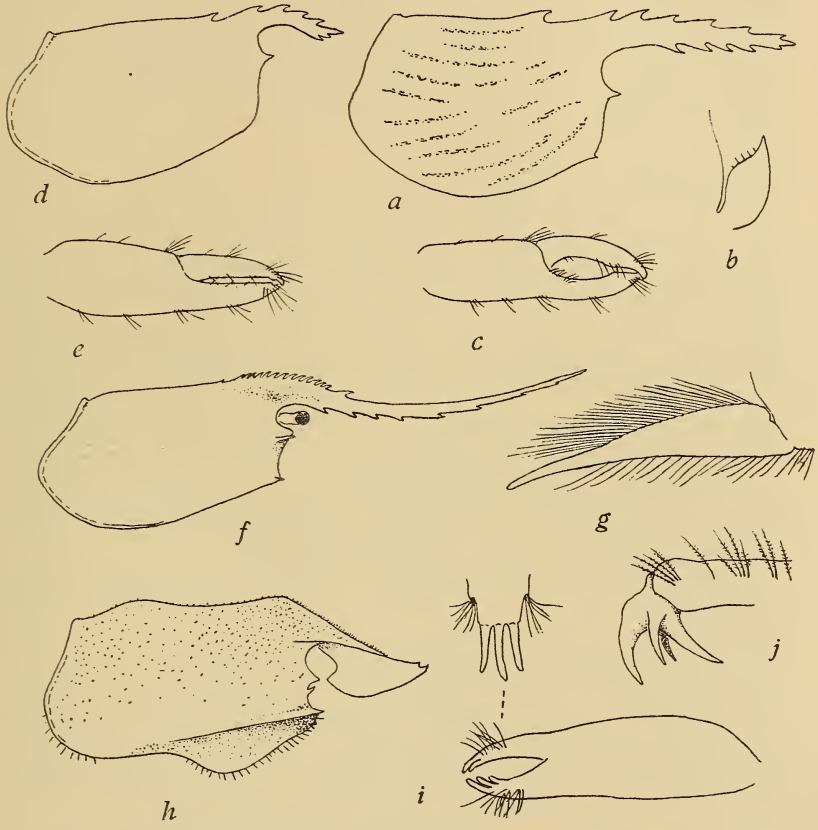


Fig. 132.—*Hippolysmata vittata* Stimpson. *a*, carapace (stripes copied from Stebbing's figure of *durbanensis*). *b*, lateral process of basal joint of ant. 1. *c*, chela of 1st leg.

Hippolysmata kükenthali (de Man). *d*, carapace. *e*, chela of 1st leg.

Hippolysmata (*Exhippolysmata*) *tugelae* Stebb. *f*, carapace. *g*, endopod of pleopod 1 (♂ and ♀), setae actually plumose.

Gelastocaris paronae (Nob.). *h*, carapace, lower border drawn as if pulled out, normally bent under lateral ridge. *i*, chela of 1st leg, with apex of finger further enlarged. *j*, dactyl, and apex of 6th joint of 3rd–5th legs.

Remarks.—Endopod of mxp. 1 is not quite like Gordon's figure (*l. c.*, fig. 11, *d*). as the ultimate joint is not more than half the length of the penultimate; the latter has a few plumose setae on inner surface.

Hippolysmata kükenthali (de Man)

Fig. 132, *d*, *e*.

1902. de Man, Abh. Senckenberg. Ges., xxv, p. 850 (*Hippolyte k.*), and p. 849, pl. 26, fig. 56 (as *Merhippolyte orientalis* Bate ?).

1914. Kemp, *l. c.*, p. 115, pl. 6, fig. 11 (chela) (references).

1919. Stebbing, *l. c.*, p. 120, pl. 18 (*marleyi*).

1921. *Id.*, *l. c.*, p. 22 (*marleyi*).

1947. Holthuis, *l. c.*, p. 69.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 386.

Carapace with antero-lateral corner rounded; one post-rostral tooth, rostrum more or less curved, with 4–6 teeth above, 1–3 below. Lateral process of basal joint of ant. 1 as long as basal joint, latter without tooth on lower inner margin. Finger and thumb of 1st chela meeting throughout their length. Wrist of 2nd leg with 19–21 jointlets. 4th joint of 3rd and 4th legs (♀) with 2 slender adpressed spines on outer surface distally, 5th leg without spines. Dactyls of 3rd–5th legs, and telson as in *vittata*.

Length up to 32 mm. "Golden-brown on white with irregular lines and curves" (Stebbing: *marleyi*). Broadly banded transversely with bright red (Kemp, and S. Afr. Mus. specimen).

Localities.—Isezela, Natal (Stebbing); Durban and Delagoa Bay (S. Afr. Mus.).

Distribution.—Ceylon, East Indies.

Remarks.—The Delagoa Bay specimen has the rostrum less curved than in the Durban specimen here figured, a minute point on the antero-lateral corner of carapace, a minute tooth on lower margin of basal joint of ant. 1, and 2 adpressed spines on 4th joint of 5th as well as 3rd and 4th legs. Otherwise it agrees with the above.

The endopod of mxp. 1 is similar to that of the South African specimens of *vittata*.

Hippolysmata (*Exhippolysmata*) *tugelae* Stebb.

Fig. 132, *f*, *g*.

1915. Stebbing, *l. c.*, p. 94, pl. 25 (Crust., pl. 89).

1916. Kemp, *l. c.*, p. 402.

Carapace with pterygostomial spine as well as the antennal spine; above the latter the suborbital margin has a small rounded lobe (not indicated in Kemp's figures of *ensirostris*, not even in his fig. 7 on

pl. 7, *l. c.*, 1914); rostrum longer than carapace, gently curved upwards, with elevated basal crest extending on to carapace, one small tooth on carapace followed by 12–14 (or 15) teeth, closely set but slightly spaced anteriorly, and the foremost one separated by a distinct gap; rest of dorsal edge of rostrum smooth; ventrally with 7–9 teeth (in one case 5, in one other case 11). Finger and thumb of 1st chela when closed in contact throughout their length. 3rd joint of 2nd leg with strongly curved spine-seta on its lower margin, wrist with 12–13 jointlets. 4th joint of 3rd–5th legs with a series of strong spines on lower margin (*ca.* 8 on 3rd and 4th legs, 6 on 5th), 6th joint of 5th leg with serrate spines distally; dactyls slender, 3–4 spines on inner margin proximally. Rudimentary epipods on 1st–4th legs. Endopod of pleopod 1 narrow, tapering, the apical third not fringed with setae. Telson tapering to a fine point with a pair of subapical spinules, 2 pairs of dorso-lateral spines.

Length up to ♀ 74 mm. (tip of telson to orbit 49, rostrum 25), ♂ 50 (32 + 18 resp.).

Localities.—Off Tugela River, Natal, 12 fathoms, and off Cape Henderson (north of East London), 26 fathoms (Stebbing).

Remarks.—Only one specimen was caught off Cape Henderson, but 24 were caught off the Tugela River. There are 19 ♀♀ (17 of them ovig.) and 3 ♂♂ from the latter locality in the South African Museum. The ♂♂ have both appendix interna and appendix masculina on pleopod 2, and the endopod of pleopod 1 is similar to that of the ♀, and without coupling-hooks. Possibly they are not quite mature.

The spines on the 4th joints of 3rd–5th legs were overlooked by Stebbing, but they are shown in Kemp's (1914) figure of *ensirostris.*

The endopod of mxp. 1 was correctly figured by Stebbing, except that the penultimate joint is stouter, and carries on its inner surface numerous long plumose setae.

H. tugelae is very closely allied to *ensirostris* Kemp, but is distinguished by the perfectly smooth dorsal edge of the rostrum in front of the basal crest, which carries a larger number of teeth than in the Indian species. See also Holthuis, 1947, *l. c.*, p. 74.

Gen. Gelastocaris Kemp

1914. Kemp, *l. c.*, p. 106.

No arthrobranchs on legs. Mandible without incisor process or palp. Mxp. 3 without exopod. Epipods on first 4 legs. Rostrum in dorsal view triangular, deeply lamellate in lateral view. No supra-

orbital spine; antero-lateral margin of carapace (below antennal spine) not serrate. Lateral process of basal joint of ant. 1 curving upwards and protecting the small eyes laterally, apical margin of basal joint curving upwards and protecting the eyes anteriorly. Upper flagellum of ant. 1 uniramous. 1st leg slender, chela with apical interlocking spines. Wrist of 2nd leg with 3 jointlets. Dactyls of 3rd–5th legs very short, 4-unguiculate (2 in middle line, one on each side).

Gelastocaris paronae (Nobili)

Fig. 132, *h–j*.

1905. Nobili, Boll. Mus. Torino, xx, no. 506, p. 2, text-fig. (*Latreutes p.*).

1914. Kemp, *l. c.*, p. 107, pl. 5, figs. 1–11.

1916. *Id.*, *l. c.*, p. 401.

1925. *Id.*, *l. c.*, p. 337.

1947. Holthuis, *l. c.*, p. 63.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 386.

Animal robust and depressed. Integument shortly pilose, chiefly conspicuous on anterior part of carapace, telson and uropods. Carapace saddle-shaped, a post-orbital tooth and below it a spine, a post-antennal spine, antero-inferior margin rounded (sometimes with a minute denticle), lower margin anteriorly flexed inwards, the ridge from the post-antennal spine appearing to be the lower lateral border of carapace. Rostrum broadly triangular in dorsal view, in lateral view deeply lamellate, apex bidentate. Outer margin of antennal scale spinulose. Finger and thumb of 1st chela spoon-shaped, with 3–4 (Kemp says 2–3) interlocking spines, and lateral tufts of plumose setae. Wrist of 2nd leg with 2nd jointlet longest, 1st slightly longer than 3rd. 3rd–5th legs stout, with plumose setae. Telson broadly triangular, 2 pairs of dorso-lateral spinules, apex with slender median point, flanked on each side by 2 unequal spines. Outer ramus of uropod broadly oval, inner also broad but more ovate.

Length ♀ up to 21 mm.

Locality.—Delagoa Bay (coll. K. H. B. 1912, 2 ovig. ♀♀).

Distribution.—Zanzibar, Ceylon, Andaman Is., N. Australia, East Indies.

Remarks.—The two Delagoa Bay specimens agree with Kemp's description. His likening of the animal to an Idoteid Isopod is very apt. The specimens were dredged off Lourenzo Marques in about 2 fathoms on a very muddy bottom, together with *Alpheus notabilis* Stebb.

Family PROCESSIDAE

1910. Stebbing, *l. c.*, p. 387.

1920. de Man, Siboga Exp. monogr., xxxix *a*, 3, pp. 192 *sqq.*

Rostrum short, unarmed. Mandible without incisor process or palp. Mxp. 2 with 7th joint attached laterally to 6th joint. Mxp. 3 large, pediform, with exopod. Exopods absent from all legs (*Processa*), or present only on 1st leg (*Nikoides*). No epipods on legs. 1st pair of legs asymmetrical, one simple, the other chelate. 2nd pair of legs unequal, one much longer than the other, both chelate, 4th and 5th joints multiarticulate. Telson channelled. Gills 5 + 2 epipods.

Gen. Processa Leach

1815. Leach, Mal. Podophth. Brit., text to pl. 41 (1st July).

1816. Risso, Hist. Nat. Crust. de Nice, p. 84 (*Nika*).

1905. Stebbing, Mar. Invest. S. Afr., iv, p. 89 (synonymy).

1910. *Id.*, *l. c.*, p. 387.

1920. de Man, *l. c.*, p. 197 (list of species).

1922. *Id.*, Siboga Exp. monogr., xxxix*a*, 4, p. 44.

1923. Gurney, J. Mar. Biol. Assoc. Plym., n.s., xiii, p. 245 (larval stages).

1936. Lebour, Proc. Zool. Soc. Lond., ii, p. 609 (specific characters and development).

1937. Gurney, *ibid.*, p. 85 (key to species).

1941. Lebour, Ann. Mag. Nat. Hist. (xi), 7, p. 401.

With the family characters. No exopods on any of the legs.

Remarks.—*P. edulis* (Risso) is one of the edible shrimps of commercial importance in the Mediterranean.

Key to the South African Species.

1. Body and 3rd–5th legs slender. 5th abdominal segment with hind corner rounded . . . . . *austroafricana.*
2. Body and 3rd–5th legs stout. 5th abdominal segment with hind corner dentate . . . . . cf. *edulis.*

Processa austroafricana Brnrd.

Fig. 133, *a–d.*

1905. Stebbing, *l. c.*, p. 91 (*canaliculata*, non Leach).

1910. *Id.*, *l. c.*, p. 387 (*canaliculata*, non Leach).

? 1918. *Id.*, Ann. Durban Mus., ii, p. 61 (*Processa* sp.).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 24 (*canaliculata*, non Leach) (? p. 5).

1925. Balss, D. Tiefsee Exp., xx, p. 294 (part *canaliculata*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 386.

Rostrum about $3\frac{1}{2}$ times in length (median line) of rest of carapace, reaching about to end of eyes, apically bidentate, lower point longer

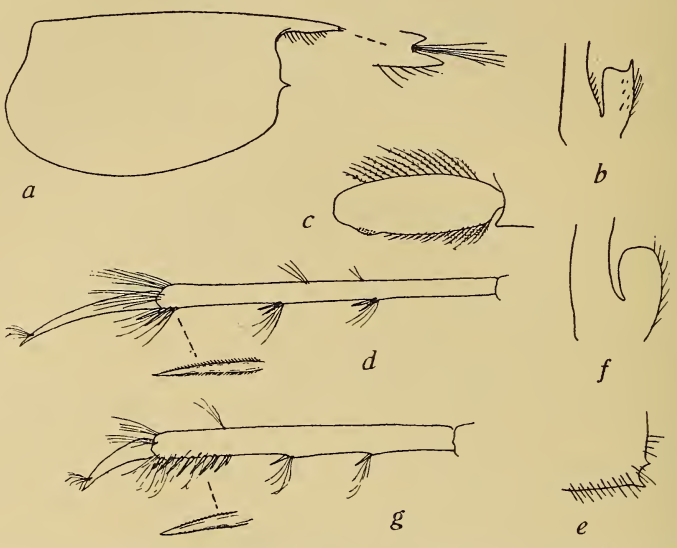


Fig. 133.—*Processa austroafricana* Brnrd. *a*, carapace, with apex of rostrum further enlarged. *b*, lateral process of basal joint of ant. 1. *c*, endopod of pleopod 1 ♂. *d*, 6th joint and dactyl of 5th leg, with spine further enlarged. *Processa* cf. *edulis* (Risso). Algoa Bay specimen. *e*, postero-inferior corner of 5th abdominal segment, left side. *f*, lateral process of basal joint of ant. 1. *g*, 6th joint and dactyl of 5th leg, with spine further enlarged.

than upper, with tuft of setules; antennal spine distinct, antero-lateral corner of carapace rounded. Lateral process of basal joint of ant. 1 short, quadrangular, inner corner rounded, outer acute (cf. *australiensis* Baker, 1907, Trans. Roy. Soc. S. Austral., xxxi, p. 185, pl. 25, fig. 2, *a*); 2nd peduncular joint $1\frac{1}{2}$–$1\frac{2}{3}$ as long as 3rd; inner flagellum at least as long as body. Antennal scale $\frac{1}{2}$–$\frac{3}{4}$ median length of carapace (excl. rostrum). Eyes large, wider than antennal scale. Mxp. 3 extending beyond antennal scale by at least whole of apical joint, usually by apical joint and half the penultimate joint. Right leg of 1st pair chelate, left simple; 4th joint (measured along its longest margin) of chelate leg subequal to wrist plus chela. Right leg of 2nd

pair usually longer than left; the mero-carpal bend of the former being beyond apex of shorter (outer) flagellum of ant. 1, of the latter below the eye. 3rd–5th legs slender; 3rd joint of 3rd and 4th legs with 2 spines, 4th joint with 5 movable but more or less adpressed spines; joints of 5th leg without spines; 4th joint of 4th leg longer than 6th, 5th a little more than twice length of 6th, dactyl half length of 6th; in 5th leg 4th and 5th joints subequal, 6th shorter, 6th $2\frac{1}{2}$ times length of dactyl, its lower margin with 2 pairs of spines, and 3 at apex, these spines doubly and distinctly serrate (fig. 133, *d*). All dactyls slender. Endopod of pleopod 1 ♂ oval, apically rounded, the spinulose lobe sometimes more prominent than in fig. 133, *c*; of ♀ lanceolate. Postero-inferior corner of 5th abdominal segment rounded-quadrate, without any denticle. Telson dorsally channelled, with 2 pairs of conspicuous dorso-lateral spines, 3 unequal pairs on apex.

Length up to ♀ 38 mm. "Eyes blue, ova green" (s.s. *Pieter Faure* log-book).

Localities.—Off Cape St Blaize, 40 fathoms, off Knysna, 30 fathoms, Algoa Bay, 10–16 fathoms (Stebbing); Cape Infanta and St. Sebastian Bay, 61 and 72 metres (Odhner); off Cape Agulhas, 120–126 metres (Balss); Agulhas Bank from Cape Agulhas to Algoa Bay and Gt. Fish Point, 20–26 fathoms (S. Afr. Mus.).

Remarks.—The South African specimens agree in nearly all respects with *canaliculata* as described and figured by Lebour. They differ chiefly in the basal process (stylocerite) of antenna 1 which resembles that of *australiensis*, and also the constantly fewer spines on 4th joints of 3rd and 4th legs.

They differ from *australiensis* in having no denticle on hind corner of 5th abdominal segment, and a longer 4th joint on the chelate 1st leg. In these respects they resemble the South Australian *gracilis* Baker, but without a direct comparison of actual specimens it would be unwise to presume specific identity.

Some 300 specimens have been examined, and the above characters appear to be constant. None were observed with both left and right legs of the 1st pair chelate, such as Rathbun (1904, Harriman Alaska Exp., x, p. 110) has recorded.

This species is common on the Agulhas Bank, but apparently does not extend very far east of Algoa Bay. Stebbing's record is the only one from the Natal coast. Ovigerous ♀♀ were taken from June to December.

Processa cf. *edulis* (Risso)

Fig. 133, *e–g*.

1936. Lebour, *l. c.*, p. 611, pl. 2, figs. 1–6, pl. 3, figs. 1–8, pl. 4, figs. 8–10 (specific characters, synonymy).

1941. *Id.*, *l. c.*, pp. 408, 409 (differential characters).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 386.

Amongst numerous slender specimens from Algoa Bay a single ovig. ♀ was at once conspicuous on account of its robust form and short legs. It appears to be referable to *edulis*, but with only a single specimen the identification can be regarded only as provisional.

Lateral process of basal joint of ant. 1 apically rounded, the 2nd and 3rd peduncular joints subequal, and the inner flagellum much shorter than the body. Spines on 4th joint of 3rd and 4th legs 5; 5th joint of 4th leg not twice as long as 6th; 5th joint of 5th leg shorter than 6th, latter with 2 single spines far apart on lower margin and 7 close together distally, each of the proximal two in this series accompanied by a shorter spine (*i.e.* 2 pairs followed by 5 single ones), the spines obscurely serrulate (fig. 133, *g*); all dactyls stout, much shorter than 6th joints. Postero-inferior corner of 5th abdominal segment with 1 denticle on right, 2 on left side.

Length 25 mm.

Locality.—Algoa Bay, 10 fathoms (S. Afr. Mus.).

Distribution.—*P. edulis*, as defined by Lebour, is known from the Mediterranean, English Channel, and Irish Sea.

Remarks.—The University of Cape Town Ecological Survey has recently captured two specimens in 15–19 metres on the west side of False Bay. Lebour (1936) says that at Plymouth the larger, more slender species *canaliculata* occurs chiefly on the outer ground, whereas the smaller more robust species *edulis* occurs closer inshore.

Family GLYPHOCRANGONIDAE.

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 36.

1910. *Id.*, *l. c.*, p. 387.

1920. de Man, Siboga Exp. monogr., xxxix*a*, 3, pp. 212 *sqq*.

Body robust, integument indurated. Rostrum well developed, dorsally flattened, laterally spinose, proportionately longer in young than in adult. Carapace sculptured and carinate. Abdomen usually sculptured, the segments firmly interlocked. Telson strong, spine-like, quadrangular in cross-section. Eye-stalks short. Upper flagellum of

ant. 1 basally thickened in ♂. Antennal scale broadly oval with thickened midrib. Mandible without incisor process or palp. Mxp. 2 with 7th joint attached laterally to 6th joint. Mxp. 3 stout, pediform, coxal joint interlocking with pterygostomial margin of carapace, with exopod but no epipod. No exopods or epipods on legs. 1st leg stout, subchelate, the claw-like dactyl folding against upper surface of 6th joint, 3rd joint acutely produced medianly. 2nd leg minutely chelate, wrist multiarticulate. Dactyls of 4th and 5th legs sexually dimorphic (in some species). Gills 11 or 9 plus 2 epipods. Eggs few and large.

Gen. Glyphocrangon M. Edw.

1908. Stebbing, *l. c.*, p. 36.

1920. de Man, *l. c.*, p. 214 (list of species, and key).

With the above characters. *Glyphocrangon* sensu stricto has large, deeply-pigmented eyes, and 11 gills on each side; the subgen. *Plastocrangon* Alcock, 1901, has small unpigmented eyes, and only 9 gills.

Key to the South African Species.

1. Side-plate of 5th abdominal segment trispinose (fig. 134, *d*).
   2 large teeth behind pterygostomial spine . . . *sculptus.*
2. Side-plate of 5th abdominal segment bispinose (fig. 134, *e*).
   a. No tooth behind suborbital spine . . . . *longirostris.*
   b. One tooth behind suborbital spine . . . . *dentatus.*

Glyphocrangon sculptus (S. I. Smith)

Fig. 134, *a–d*.

1908. Stebbing, *l. c.*, p. 37.

1910. *Id.*, *l. c.*, p. 387.

1920. de Man, *l. c.*, p. 218 (in key).

Integument finely setulose. Dorsal (1st) keel with 7 teeth in front of cervical groove and 4 behind, somewhat variable in size; subdorsal (2nd) keel with 7–8 teeth behind cervical groove, a group of 4–8 variable teeth in front of it, and a larger post-orbital tooth; dorso-lateral (3rd) keel with several small teeth and usually 2 larger ones behind cervical groove, sometimes almost smooth, a row of 5–8 small teeth between cervical groove and the strong suborbital spine; lateral (4th) keel behind cervical groove smooth or feebly crenulate, in front

of it with 2 large teeth, sometimes also a small one near the groove; lower part of carapace with low ridges, more or less distinct, disconnected and reticulate; small denticles scattered between the keels.

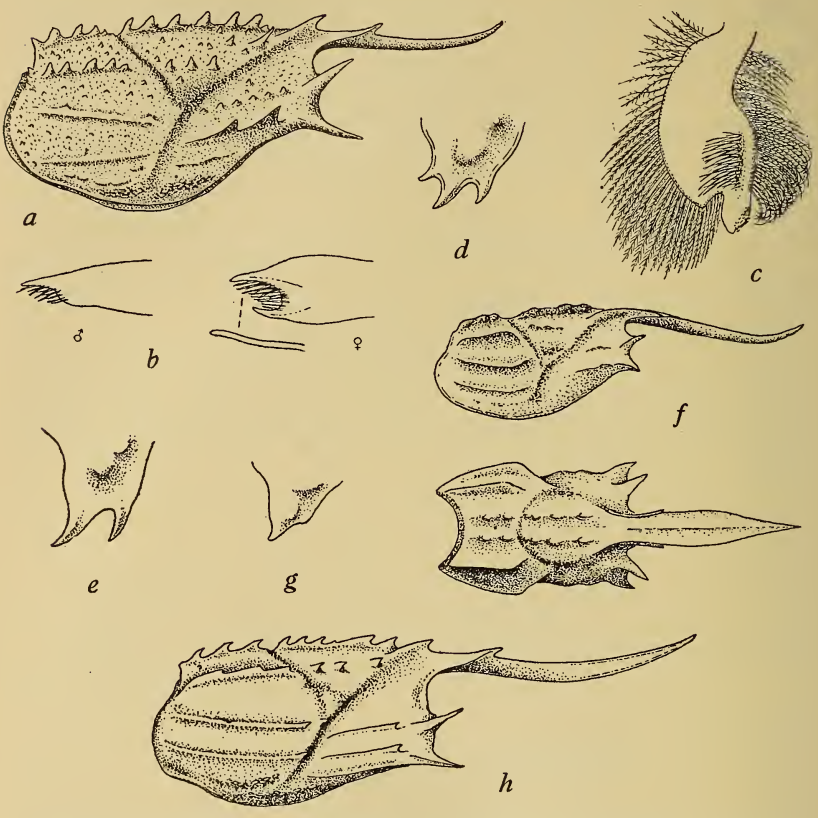


Fig. 134.—*Glyphocrangon sculptus* (S. I. Smith). *a*, carapace. *b*, apex of dactyl of 3rd and 4th legs, ♂ and ♀. *c*, endopod of pleopod 1 ♂, posterior view. *d*, side-plate of abdominal segment 5.
Glyphocrangon longirostris (S. I. Smith). *e*, side-plate of abdominal segment 5. *f*, lateral and dorsal views of carapace of juv. (carapace 17 mm., rostrum 6 mm.). *g*, side-plate of 5th abdominal segment of this juvenile.
Glyphocrangon dentatus Brnrd. *h*, carapace.

Pterygostomial projection spiniform. Abdomen dentate and tuberculate, the most prominent teeth being 3 (1 median and 1 dorso-lateral on each side) on 1st segment, a median one on segments 2 and 3, 2 median ones on segment 4, the hind one being keel-like, 2 on segment 5 flanked on each side by a keel-like tooth, 2 on segment 6, keel-like, usually with subsidiary denticles anteriorly, the hinder one ending in a strong

sharp point. Side-plate of segment 5 tri-spinose (fig. 134, *d*). Telson with a median tooth at base and denticles on the dorso-lateral and lateral keels proximally. Dactyl of 3rd leg unguiform, flattened dorso-ventrally, apex acute; dactyls of 4th and 5th legs cylindrical and surrounded by a tuft of long spine-setae arising from apex of 6th joint; on these two legs apex of dactyl in ♂ with slight swelling on outside, in ♀ swollen distally and bidentate; apex of the dactyl in 3rd–5th legs with a bunch of filiform setae, best developed on 4th and 5th legs in ♀ (fig. 134, *b*). A small setiferous median tubercle on 5th thoracic sternite. In ♂ a median tubercle on 1st abdominal sternite and a less conspicuous one on 2nd. Upper flagellum of ant. 1 longer and more swollen proximally in ♂ than in ♀. Endopod of pleopod 1 larger in ♂ than ♀, modified, the band of setae on a ridge on posterior surface apparently forming together with the marginal (inner) setae a kind of channel (fig. 134, *c*).

Length ♂ up to 92 mm., ♀ 111 mm. (tip of telson to orbit: 76 and 94 resp.); smallest ♂ with both appendix masculina and appendix interna 70 mm. (58 mm.). After many years in formalin the eyes are yellowish or orange-brown.

Locality.—Off Cape Point, 800–900 and 1000 fathoms (Stebbing, and S. Afr. Mus.).

Distribution.—East coast of N. America.

Remarks.—Only 3 ovig. ♀♀ amongst nearly three dozen specimens were taken, in July and August.

Parasites.—The Bopyrid Isopod *Bathygyge grandis* Hansen occurs in the branchial cavity.

Glyphocrangon longirostris (S. I. Smith)

Fig. 134, *e–g*.

1908. Stebbing, *l. c.*, p. 38.
1910. Kemp, Fish. Irel. Sci. Invest. [1908], p. 170.
1910. Stebbing, *l. c.*, p. 388.
1920. de Man, *l. c.*, p. 217 (in key).
1925. Balss, D. Tiefsee Exp., xx, p. 295.

In general similar to *sculptus*, but the 1st and 2nd keels on carapace and the sculpturing on abdomen usually more knobbly than dentate; only a very few, if any, denticles on the areas between the keels, the 3rd keel in front of cervical groove obsolete and the 4th keel with only one tooth behind the pterygostomial spine; median teeth and keel-like

teeth on abdomen less prominent, the two on segment 6 without subsidiary denticles and separated by only a shallow notch; side-plate of segment 5 bidentate (fig. 134, *e*). Rostrum in front of foremost tooth dorsally corrugate, giving the lateral margins in dorsal view a slightly crenulate appearance. Except that those of the 4th and 5th legs are enveloped in a brush of spine-setae on apex of 6th joint, the dactyls of 3rd–5th legs are alike, and show no sexual differences; they are dorso-ventrally flattened, more so than in *sculptus*, apices acute and only minutely setulose.

Length ♂ up to 94 mm., ♀ 110 mm. (tip of telson to orbit 74 and 90 resp.); smallest ♂ with appendix masculina as well as appendix interna 73 mm. (59 mm. to orbit); a specimen 62 mm. in length (48 to orbit) has the pleopods not sexually differentiated. Eyes dull orange-brown after many years in formalin.

Locality.—Off Cape Point, 660–800 and 900 fathoms (Stebbing, and S. Afr. Mus.).

Distribution.—East coast of N. America; west coast of Ireland; between Canaries and Cape Verde Is.

Remarks.—Although Stebbing seemed suspicious of the separation of this species from *sculptus*, there is no doubt that they are two distinct species. The difference in the dactyls of 3rd–5th legs, and the absence of sexual dimorphism in them in *longirostris*, is alone enough to justify specific rank.

Eight out of two dozen specimens are ovig. ♀♀, and were taken in July and August.

The smallest specimen examined, apparently belonging to this species and not to *sculptus*, measures 23 mm. in total length, 17 mm. to orbit; *i.e.* the rostrum is (approx.) 26 per cent. of the total length, compared with (approx.) 21–26 per cent. in adult. In dorsal view the rostrum is broader, more lanceolate than in adult.

Glyphocrangon dentatus Brnrd.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 128 (*gilesii* var. *dentata*).

1939. Calman, John Murray Exp., vi, p. 217, fig. 8 (*mabahissae*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 387 (*dentarus*, typ. err.).

Integument closely pitted (possibly pilose when alive), edges of keels more coarsely pitted. Rostrum only a little longer than rest of

carapace. 1st keel with 3 sharp teeth in front of cervical groove, 3 behind it; 2nd keel with 3 sharp teeth in front of cervical groove, behind divided into 3 low unequal portions (scarcely to be called teeth); 3rd keel in front of cervical groove forming a sharp tooth at base of suborbital spine and continued backwards to the groove, behind which it forms a smooth keel very faintly notched behind its middle and ending anteriorly in a small tooth, in front of which is another small tooth; 4th keel in front of cervical groove ending anteriorly in a sharp tooth below the tooth of 3rd keel, behind the cervical groove forming a smooth keel ending anteriorly in a sharp tooth overhanging the groove; 5th keel continuous with pterygostomial spine, and forming behind the cervical groove a low reticulate ridge; a similar ridge ventrally. Abdomen with low rounded knobs and sculpturing, but the 3 forwardly directed teeth on 1st segment strong. Antennal scale twice as long as broad. Dactyls of 3rd–5th legs as described for *assimilis* de Man (1920): on 3rd and 5th legs half as long as 6th joint, on 4th leg $\frac{2}{3}$ length of 6th joint, on 3rd leg dorsally grooved in distal half, on 4th and 5th legs grooved for nearly whole length.

Length 98 mm. (Barnard, 1926), present specimen ♂ 75 mm. (tip of telson to orbit 74 and 56 mm. resp.).

Locality.—Off coast of Portuguese East Africa (25° 59′ S., 33° 31′ E.), 540 metres (Barnard).

Distribution.—Zanzibar area, 640–658 metres.

Remarks.—The specimen on which *dentata* was based (1926), and which differed from *gilesii* W-Mason (see 1894, Illustr. Zool. "Investigator," pl. 7, fig. 4; 1901, Alcock, Cat. Ind. Deep-sea Crust., p. 132) only by the sharply tridentate posterior part of the 2nd keel, and longer rostrum, is not available to me for re-examination. A smaller ♂ specimen from the same locality is described above and figured.

My MSS. notes for the 1926 paper show that the longer rostrum was observed, although the fact did not appear in print. This was an unfortunate oversight, because Calman has recently described what appears to be the same form under the name *mabahissae*. In Calman's numerous (about 120) specimens the rostrum exceeds the carapace length by one-quarter to one-third. In the present specimen the excess is only about one-eighth. The dorsal keel is more sharply serrate than in Calman's figure, and there are only extremely faint indications of one or two granules between the dorsal and subdorsal keels. It is very likely that between the Zanzibar area and Portuguese East Africa intermediate specimens will eventually be captured.

Family ALPHEIDAE.

Cracker-shrimps.

1899. Coutière, Thèse pres. Fac. Sci. Paris, pp. 1–560, 6 pls. (definition, p. 322).

1905. *Id.*, Fauna Geogr. Mald. Laccad. Archip., ii, pp. 852-921, pls. 70–87, and text-figs.

1910. Stebbing, *l. c.*, p. 388.

1911. de Man, Siboga Exp. monogr., xxxix*a*, 1, pp. 133–465.

1915. *Id.*, *ibid.*, pls. 1–23.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 79.

1921. Coutière, Trans. Linn. Soc. Lond., 2nd ser., xvii, pp. 413–428, 5 pls.

1927. Hale, S. Austral. Crust., pt. 1, p. 44 (*Synalpheidae*).

1938. Gurney, Gt. Barrier Reef Exp. Rep., vi, pp. 44 *sqq.* (development).

Rostrum small, reduced, or absent, never spinose. Carapace sometimes with supra-orbital and pterygostomial teeth, but no antennal tooth; usually forming a hood over the short-stalked eyes and partially or wholly concealing them in dorsal view (except *Ogyrides*, where the eye-stalks are long). Mandible with incisor process and 2-jointed palp. Mxp. 2 with 7th joint attached laterally to 6th (less conspicuously so in *Ogyrides*). Mxp. 3 with exopod, epipod present or absent. 1st pair of legs usually strong, robustly chelate, often asymmetrical, especially in ♂. 2nd legs with usually 5 jointlets in wrist (3–4 in *Ogyrides*, 4 in *Arete*), minutely chelate. 5th leg with series (variable in the different genera) of spines on the outer (hinder) surface of 6th joint (both sexes); dactyls of 3rd–5th legs simple or with not more than 2 accessory denticles. Telson linguiform, usually rather short and broad; anal tubercles may be present. A movable scale at base of uropod in some genera. Gills 5 pleurobranchs (sometimes a rudimentary one on mxp. 3), 1 arthrobranch present, rudimentary, or absent on mxp. 3, plus 2–8 epipods.

Remarks.—Stebbing (1905, J. Linn. Soc. Lond., xxix, pp. 332–334) has given reasons for not accepting the proposal to substitute the name *Crangon* for *Alpheus*. Without access to the original works the question cannot be discussed here. According to Sherborne (Index), Neave (Zool. Nomencl.), etc., Weber (Nomencl. Entom. sec. syst. Fabricii, 1795) used *Alpheus* on p. 91 and *Crangon* on p. 94. If *Alpheus* was used correctly for the Crustacean in question, then it has

page precedence over *Crangon*, and precedes Fabricius' own use of it in 1798 (Entom. Syst. Suppl. See also *Alpheus*, *infra*). In any case, Hale's use of "Synalpheidae" as the family name is quite unacceptable, as there are several genera antedating Bate's genus.

Although free-living forms are found, the majority of the members of this family live more or less concealed under rocks or in crevices of corals, or they make their own burrows in sand and mud-banks.

Parasites.—Epicaridean parasites of the genera *Hemiarthrus*, *Bopyrella*, *Bopyroides*, *Argeia*, etc. are found in the branchial cavity (see Chopra, Rec. Ind. Mus., xxv, 1923, p. 416; Nierstrasz and Brandis, Vid. Medd. Dansk. nat. For., lxxxvii, p. 29). Also the curious parasite *Faba* (whose systematic position is doubtful; see Nierstrasz and Brandis, Proc. U.S. Nat. Mus., lxxvii, Art. 9, p. 1, 1930), which has already been recorded here (pp. 692, 701) on *Merhippolyte* and *Leontocaris*.

Key to the South African Genera.

I. Eye-stalks elongate, not concealed (fig. 135, *b*). 1st pair of legs symmetrical, not much stronger than 2nd pair . *Ogyrides.*

II. Eye-stalks short, more or less concealed (figs. 136–143). 1st pair of legs usually robust, at least in ♂.

A. A movable scale at base of uropod.

1. Rostrum well developed (figs. 136, 137).

a. Wrist of 2nd leg with 5 jointlets . . *Athanas.*

b. Wrist of 2nd leg with 4 jointlets . . [*Arete* *].

2. Rostrum absent (fig. 138) . . . . . *Betaeus.*

B. No movable scale at base of uropod.

1. No epipods on mxp. 3 or any of the legs. No round polished areas on base of finger and apex of 6th joint of 1st legs . . . *Synalpheus.*

2. Epipods on mxp. 3 and all legs (fig. 144, *c*). Linea impressa and round polished areas distinct on 6th joint of 1st leg (fig. 144, *d*, *n*) . . *Alpheus.*

Gen. Ogyrides Stebb.

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., xii, p. 36 (*Ogyris*, preocc.).

1899. Coutière, *l. c.*, p. 332 (*Ogyris*).

1911. de Man, *l. c.*, p. 135 (*Ogyris*) (key to species).

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 31.

* *Athanas mascarenicus* Richters 1880 from Mauritius is synonymous with one of the species of *Arete*, possibly *dorsalis* Stimpson (Coutière, *l. c.*, 1905, p. 868).

1915. Kemp, Mem. Ind. Mus., v, p. 284.

1922. de Man, Siboga Exp. monogr., xxxix*a*, 4, p. 14.

Rostrum very short or obsolete. Eye-stalks elongate, parallel. 1st legs shorter but very little thicker than 2nd legs, symmetrical; wrist of 2nd legs with 3–4 jointlets; 3rd and 4th legs strong, 5th leg slender. Exopods of mxp. 1 and 2 elongate. Mxp. 3 with penultimate (5th) joint longer than the ultimate (6th). Gills 5 plus 3 epipods (Kemp).

Remarks.—The elongate eye-stalks and elongate penultimate joint of mxp. 3 are quite exceptional in the family *Alpheidae.*

Key to the South African Species.

1. Antennal scale lanceolate, tapering to a sharp point . . *saldanhae.*
2. Antennal scale oval, lamellar part extending as far as apical spine . . . . . *occidentalis.*

Ogyrides saldanhae Brnrd.

Fig. 135.

1914. Stebbing, *l. c.*, p. 32 (*occidentalis*, non Ortmann).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 387.

Carapace setulose, with plumose setae along lower margin; (6) 7–9 spines anteriorly (these spines appear to be articulated). Rostrum short, triangular. Eyes extending to end of antennal scale, not quite to ends of peduncles of ant. 1 and 2. Antennal scale lanceolate, with straight outer margin, inner margin obliquely bevelled off from apical point. A patch of strong spines on lower margin near base on 6th joint of 1st leg (fig. 135, *e*). Wrist of 2nd leg with 4 jointlets, but the basal one often with marginal notch indicating an incomplete division (5 jointlets). 3rd and 4th joints of 3rd leg each with a strong spine on lower margin in distal half. Dactyl of 3rd and 4th legs a thin cultrate plate, elongate oval, narrower in 4th than in 3rd leg, unguis absent, an apical tuft of setules (fig. 135, *f*). Dactyl of 5th leg ensiform with long, spaced plumose setae (fig. 135, *g*). A bifurcate sternal plate arising between bases of 4th legs, projecting forwards. Telson with slightly sinuous lateral margins, a long and a short spine in a notch in distal half of lateral margin, apex with long plumose setae, 2 pairs of dorso-lateral spines, and a line of spinules, 3 curved ridges on ventral surface at base.

Length up to 18 mm.

Locality.—Saldanha Bay, 10 fathoms (Stebbing, and S. Afr. Mus.).

Remarks.—Kemp, and de Man, have drawn attention to several features not described by previous authors, as a result of which a re-examination of the original material (if it exists!) of *alphaerostris* (Kingsley), *orientalis* (Stimpson), and *occidentalis* (Ortmann) would be welcome. The first-mentioned species has been described by Hay and Shore (Bull. Bur. Fish., xxxv, 1918, p. 389), but I have not seen the paper. Yokoya (J. Coll. Agr. Imp. Univ. Tokyo, ix, 1927, p. 171, pl. 7, figs. 1–16) described a specimen assigned to *orientalis*, and was

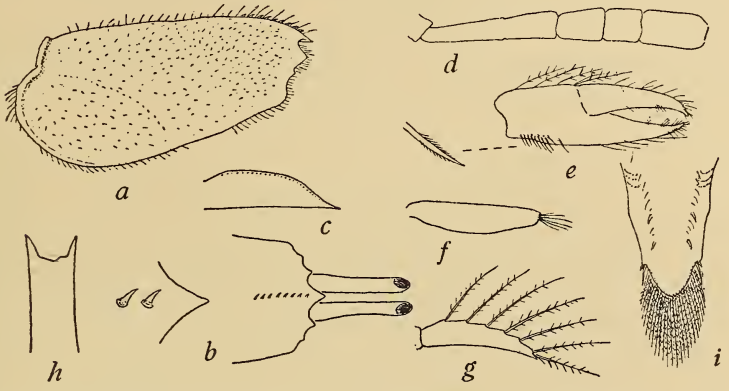


Fig. 135.—*Ogyrides saldanhae* Brnrd. *a*, carapace. *b*, dorsal view of front of carapace and eyes, rostrum and first 2 spines further enlarged. *c*, antennal scale, setae omitted. *d*, wrist of 2nd leg. *e*, chela of 1st leg. *f*, dactyl of 3rd leg. *g*, dactyl of 5th leg. *h*, sternal process between 4th legs. *i*, telson.

of opinion that *sibogae* should be synonymous. He described and figured the sternal process as a "thelycum," and, following Hay and Shore, considered that this character might justify a separate family *Ogyridae*.

To judge from descriptions, the present specimens resemble *sibogae* (de Man) in the antennal scale (de Man, *l. c.*, 1922, pl. 2, fig. 8, *b*) and the spines on 3rd leg, but the eyes are not so long in *sibogae*, and the dactyls of 3rd and 4th legs appear to be different. The shape of the antennal scale at once puts Stebbing's identification with *occidentalis* out of court.

Many specimens were caught, the largest a non-ovigerous ♀; none were obviously males.

The Amphipod recorded by Stebbing is not *P. mirabilis* but *P. capensis* Brnrd. 1925.

Ogyrides occidentalis (Ortm.)

1893. Ortmann, Plankton Exp. II. G.b., p. 46, pl. 3, figs. 4, 4, *a*, etc.
1913. Balss, Schultze Reise, v, p. 107 (*Ogyris o.*).
1916. *Id.*, Beitr. Kenntn. Meeresf. Westafr., ii, p. 20 (*Ogyris o.*).

Antennal scale oval, the lamella extending as far as the apical spine (Ortmann's fig. 4, *a*).

Locality.—Luderitzbucht (Balss).

Distribution.—Mouth of the Tocantins, Brazil; Gold Coast, Cameroons, Angola (north of Loanda).

Remarks.—Balss' material both from the West African coast and from Luderitzbucht should be re-examined; in the meantime the Luderitzbucht record should be accepted with reserve.

Gen. Athanas Leach

1899. Coutière, *l. c.*, *passim*, definition on p. 323.
1906. Sars, Arch. Math. Naturvid., xxvii, no. 10 (development).
1911. de Man, *l. c.*, p. 144 (key to species).
1915. Kemp, Mem. Ind. Mus., v, p. 289.
1922. de Man, Siboga Exp. monogr., xxxix*a*, 4, pp. 16–22.
1927. Gurney, Trans. Zool. Soc. Lond., pt. 2, p. 260 (larva).
1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 119.
1936. Kubo, J. Imp. Fish. Inst. Tokyo, xxxi, p. 43.
1940. *Id.*, *ibid.*, xxxiv, p. 93.

Rostrum well developed. Supra-orbital tooth present or absent; infra- and extra-orbital teeth both present. Eye-stalks short, divergent, not wholly concealed by carapace. Upper flagellum of ant. 1 biramous. Antennal scale broadly oval. 1st legs robust, at least in ♂, often asymmetrical, directed forwards or bent-up, the hand reposing in the grooved 4th joint. Wrist of 2nd leg with 5 jointlets. 5th leg not more slender than 3rd or 4th leg. A movable scale at base of uropod. Gills 5 plus 7 epipods.

Remarks.—On account of growth-changes and sexual dimorphism it is often difficult, especially where there is very little material, and often only ♀♀, to determine the specific identity. None of the South African specimens can be definitely assigned to a particular species, and the following key is a key to the *specimens*, not to species.

Key to the South African Specimens.

Supra-orbital tooth present	Infra-orbital tooth smaller than extra-orbital	♀ St. James (Stebbing)	cf. *nitescens.*
		♂♀ Algoa Bay, East London, Durban	or *grimaldii.*
		♀ Umhlali	or *naifaroensis.*
	Extra-orbital tooth smaller than infra-orbital . . .	♂ Mozambique . .	cf. *djiboutensis.*
Supra-orbital tooth absent . .		♂ Umtwalumi, ♀ Mozambique	cf. *minikoensis.*
Supra-orbital tooth not recorded, nor sex.		Durban (Stebbing)	cf. *grimaldii.*

Athanas, cf. *nitescens* Leach, or *grimaldii* Cout.

Fig. 136, *a–e.*

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 88 (*Athanas* sp.).

1921. *Id.*, Ann. Durban Mus., iii, p. 18 (*grimaldii* Cout.).

♂ Algoa Bay. Supra-orbital tooth feeble, infra-orbital also small. Basal process of ant. 1 extending just beyond end of 2nd peduncular joint, a strong tooth on inner lower margin of 1st joint. 1st legs directed forwards, symmetrical, 3rd joint not grooved below, 4th joint ¾ and 5th joint ½ length of 6th (excl. thumb), 4th joint channelled below nearly to base, finger and thumb longer than 5th joint; in ♀ and immature ♂ (fig. 136, *c*) finger and thumb leave no gap when closed, cutting-edge of thumb convex, both cutting-edges crenulate or dentate; at a later stage (detached chela of ? ♀, fig. 136, *d*) the cutting-edges are strongly toothed; in fully adult ♂ (fig. 136, *e*) finger and thumb widely gaping, each cutting-edge with only one tooth in middle. Wrist of 2nd leg with 1st jointlet less than the other jointlets together, chela equal to last 2 jointlets together, finger and thumb equal to palm. Lower margin of 6th joint of 3rd and 4th legs with spaced spine-setae, of 5th leg with 3–4 similar spines proximally, distally with the spines close-set as in Kemp's figure (1910, Fish. Irel. Sci. Invest. [1908], pl. xix, fig. 5). Dactyls of 3rd–5th legs simple, or occasionally with a microscopic denticle at base of unguis. Telson with 2 pairs of dorso-lateral spines. Appendix interna on pleopod 2 not reaching end of endopod.

Length, a ♂ 17 mm. in length has the 1st leg (2nd joint to apex) 11·5 mm. in length.

Localities.—False Bay, St. James (Stebbing); Durban (Stebbing); Algoa Bay, East London, Durban (S. Afr. Mus.).

Distribution.—nitescens: Europe and Mediterranean to Cape Verdes; *grimaldii:* Cape Verdes to Lagos.

Remarks.—The South African specimens have all been found at

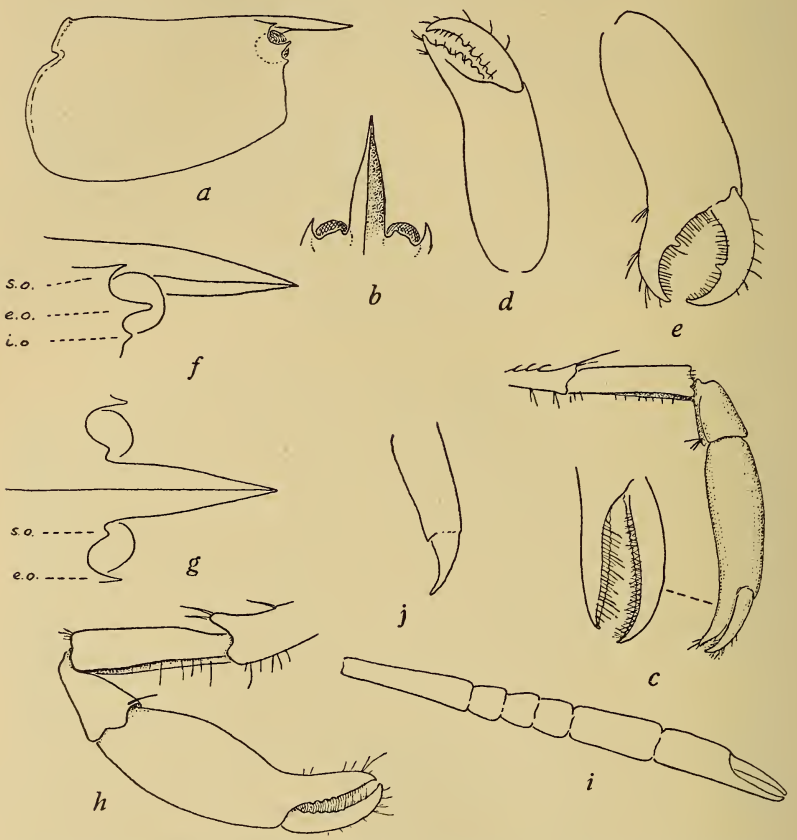


Fig. 136.—*Athanas* cf. *nitescens* Leach. *a*, carapace. *b*, dorsal view of rostrum. *c*, outer view of 1st leg of ♀ and not fully-grown ♂, with finger and thumb further enlarged. *d*, chela of 1st leg of ? ♀. *e*, chela of 1st leg of adult ♂.
Athanas cf. *naifaroensis* Cout. *f*, *g*, lateral and dorsal views of rostrum. *h*, 1st leg of ♀ (symmetrical). *i*, wrist and chela of 2nd leg ♀. *j*, dactyl of 3rd leg.
(*e.o.*, *i.o.*, *s.o.*, extra-, infra-, and supra-orbital spines.)

shipping centres (St. James is not far from Simonstown). They all belong to the *nitescens* group, but with so little material it is impossible to say whether they are *nitescens*, *grimaldii*, or some other species. Moreover, it can scarcely be claimed that *grimaldii* is really distinct from *nitescens*; *e.g.* Lenz and Strunck (1914) find the accessory

denticle on the dactyls of 3rd–5th legs in Mediterranean examples of *nitescens* as well as in *grimaldii*.

Athanas, cf. *naifaroensis* Cout.

Fig. 136, *f–i*.

1905. Coutière, F. Geogr. Mald. Laccad. Archip., ii, p. 859, fig. 131 (♀).

1922. de Man, *l. c.*, p. 16, pl. 2, fig. 9.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 387.

♀. Supra-orbital tooth small, not so acute and prominent as in *naifaroensis*, infra-orbital smaller than extra-orbital tooth. 1st leg (fig. 136, *h*) symmetrical. Wrist of 2nd leg with 1st jointlet less than the others combined, chela equal to last 2 jointlets together, finger and thumb equal to palm. Dactyls of 3rd–5th legs with microscopic denticle.

Length 15 mm., 4th–6th joints of 1st leg 7 mm., 6th joint of 1st leg 4 mm.

Locality.—Umhlali, Natal (coll. Prof. T. A. Stephenson, 1 ovig. ♀).

Remarks.—This ♀ corresponds very closely with the Algoa Bay ♂ described above. As can be seen from Kemp's table (1915) only *naifaroensis* (Maldives) and *grimaldii* have symmetrical and enlarged 1st legs in ♀. Stebbing's Durban specimen had asymmetrical 1st legs, but its sex was not recorded.

Athanas, cf. *minikoensis* Cout.

Fig. 137, *a–d*.

1905. Coutière, *l. c.*, p. 858, fig. 130 (♀).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 388.

♂. Supra-orbital tooth absent, infra-orbital much smaller than extra-orbital tooth (as in *minikoensis* ♀). 1st leg (only the right present) (fig. 137, *c*), 3rd and 4th joints separate, both ventrally channelled; 5th and 6th joints fused. Dactyls of 3rd–5th legs without denticle, though the limits of unguis and joint are fairly distinct.

Length 16 mm., 3rd plus 4th joints 1st leg, and also 5th plus 6th, 6 mm.

Locality.—Umtwalumi, Natal (coll. Prof. T. A. Stephenson, 1 ♂).

Remarks.—Very like *minikoensis* (Minikoi Atoll) as regards carapace, but ♂ of Coutière's species unknown from the type locality. de Man (1911) compares an East Indies ♂ with that of *dimorphus* Ortmann

(1894, Semon's Austral. Reise, v, p. 12), but the exact character of the cutting-edges of the finger and thumb is not very clear.

An ovig. ♀ from Mozambique (K. H. B. 1912) agrees as regards the carapace. The 1st legs are symmetrical and scarcely enlarged.



Fig. 137.—*Athanas* cf. *minikoensis* Cout. *a*, *b*, lateral and dorsal views of rostrum. *c*, 1st leg (right) ♂. *d*, dactyl of 3rd leg.
Athanas cf. *djiboutensis* Cout. *e*, carapace. *f*, inner view of left 1st leg ♂, with cross-section of 4th joint, and finger and thumb further enlarged.

Athanas, cf. *djiboutensis* Cout.

Fig. 137, *e*, *f*.

1897. Coutière, Bull. d'Hist. Nat. Paris, no. 6, p. 233.

1898. Borradaile, Proc. Zool. Soc. Lond., p. 1011, pl. 65, figs. 9, 9, *a–i* (*sulcatipes*).

1899. Coutière, *l. c.*, pp. 62, 177, figs. 4, 107.

1905. *Id.*, *l. c.*, p. 856, fig. 129.

1911. de Man, *l. c.*, p. 147 (in key).

1922. *Id.*, Siboga Exp. monogr., xxxix*a*, 4, p. 21.

1938. Gurney, Gt. Barrier Reef Exp. Rep., vi, p. 54, figs. 249–252 (larva).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 388.

♂. Supra-orbital tooth present, infra-orbital larger than extra-orbital tooth. 1st leg greatly enlarged, slightly asymmetrical (Coutière); in present specimen only left leg available (fig. 137, *f*); 3rd and 4th joints fused, 4th broadly fusiform, both lower margins forming wide flanges, 5th not fused with 6th, lower margins forming lobe-like flanges; 6th longer than 4th, thumb angularly bent, cutting-edge forming a broad triangle, apex hooked, finger nearly evenly curved, its cutting-edge without any denticles. Dactyls of 3rd–5th legs simple.

Length 10 mm., 1st leg (3rd joint to apex as figured) 7 mm. Pale claret (K. H. B.).

Locality.—Mozambique (Island) (coll. K. H. B. 1912, 1 ♂).

Distribution.—Red Sea, Maldive Archipelago. East Indies, Funafuti Atoll (Ellice Group, Pacific).

Gen. Betaeus Dana

1852. Dana, Proc. Ac. Nat. Sci. Philad., vi, p. 16.

1899. Coutière, *l. c.*, *passim*, definition on p. 328.

1904. Rathbun, Harriman Alaska Exp., x, p. 108.

1911. de Man, *l. c.*, p. 173.

1927. Yokoya, J. Coll. Agr. Imp. Univ. Tokyo, ix, p. 173.

1936. Kubo, J. Imp. Fish. Inst. Tokyo, xxxi, p. 50.

Rostrum absent. Front of carapace more or less truncate, or emarginate, concealing the eyes; no supra-orbital spines. 1st pair of legs symmetrical or nearly so, robust, twisted so that the finger of the chela is ventral. Dactyls of 3rd–5th legs simple or with accessory denticle. A movable scale at base of uropod. Telson with anal tubercles (except in one species). Gills 5 plus 1 arthrobranch, and (usually) 8 epipods.

Richters described *B. utricola* (1880, Beitr. Meeresf. Maurit., p. 154, pl. 17, figs. 34, 35) from Mauritius.

Betaeus jucundus Brnrd.

Fig. 138.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 388.

Carapace truncate and very slightly convex in front in dorsal view, surface faintly hollowed but no median V-shaped groove, hind lateral

margin with a notch. No tooth or projection on inner side of cornea on eye-stalk, no ophthalmic scales. Ocellar tubercle inconspicuous. 1st and 2nd joints of ant. 1 subequal (measured along inner margin), basal process extending almost to outer apex of 2nd joint, a strong ventral tooth on 1st joint. 2nd joint of ant. 2 with short dorsal and ventral spines, the dorsal smaller than the ventral; scale extending

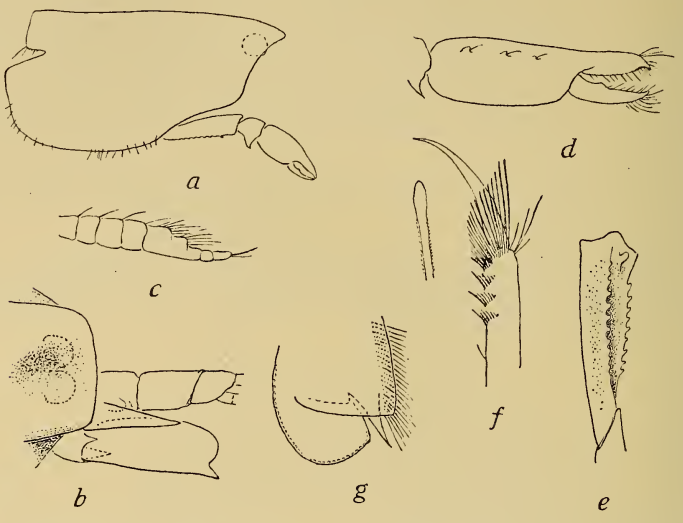


Fig. 138.—*Betaeus jucundus* Brnrd. *a*, carapace and 1st leg. *b*, dorsal view of anterior part of carapace, with base of 1st antenna, and antennal scale. *c*, upper flagellum of antenna 1. *d*, inner view of chela of 1st leg. *e*, lower (inner) view of 4th joint of 1st leg. *f*, dactyl and apex of 6th joint of 5th leg. *g*, dorsal view of outer ramus of uropod.

to end of 3rd joint. Mxp. 3 reaching slightly beyond middle of antennal scale. 1st legs symmetrical, 4th joint channelled below, both margins with blunt serrations and a larger blunt tooth in middle of the channel distally; palm with 3 little tubercles on inner surface each with a seta at its base, finger with a low tooth on cutting-edge. 1st jointlet of wrist of 2nd leg not quite equal to the others combined, 5th equal to 3rd plus 4th. 3rd joint of 3rd and 4th legs with strong spine on lower margin near apex; 4th joint of 3rd–5th legs with prominent spine in middle of lower margin; 5th joint with an apical spine; 6th joint with 4 spines on lower margin on 3rd leg, 3 on 4th leg, only 2–3 fine setae on 5th leg, but distally 4 series of finely serrulate spines and an apical brush of long spines; dactyls elongate, slender, curved, finely pointed, unarmed. Epipods on mxp. 3 and 1st–4th legs. No arthrobranch on mxp. 3 observed. Lower margins of

abdominal pleurae rounded, postero-inferior angle of 5th rounded-quadrate; a movable scale at base of uropod. Telson broadly linguiform, not quite twice as long as greatest breadth, 2 pairs of dorsal spines, the anterior pair in the anterior half, 2 unequal spines laterally, the curved apical margin with 16 plumose setae; anal tubercles distinct. Outer ramus of uropod with strong spine arising from ventral surface of diaeresis which is straight. Gills 5 plus 8 epipods (? arthrobranch).

Length ♀ 13 mm. Pale buff, semi-transparent, eggs green (K. H. B.).

Locality.—Keurbooms River estuary, Plettenberg Bay (K. H. B., Jan. 1931, 1 ovig. ♀).

Remarks.—This species is clearly distinct from *indicus* de Man (eyes, dactyls, etc.) and other species of which descriptions or figures are available. The dactyls seem to correspond with those of *harrimani* Rathbun.

Gen. Synalpheus Bate

1899. Coutière, *l. c.*, definition on p. 334.

1909. *Id.*, Proc. U.S. Nat. Mus., xxxvi, pp. 1–93 (key to groups and to American species).

1911 and 1915. de Man, *l. c.*, pp. 185 *sqq.* (list of Indo-Pacific species, and key) and plates.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 85.

1921. Coutière, *l. c.*, p. 414.

1922. de Man, Siboga Exp. monogr., xxxix*a*, 4, pp. 26–32.

1927. Gurney, *l. c.*, p. 261 (larva).

1938. *Id.*, *l. c.*, p. 48 (larva).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 87.

Eyes concealed. Rostrum short, spiniform. Supra-orbital spines smaller than or about equal to rostrum. Upper flagellum of ant. 1 feebly biramous; 1st peduncular joint long, its basal process well developed. Antennal scale narrow. 1st legs robust and symmetrical, at least in ♂; no round polished areas on base of finger or apex of 6th joint (see *Alpheus*), *linea impressa* (see *Alpheus*), if present, feebly developed. Wrist of 2nd leg with 5 jointlets. No epipods on mxp. 3 or any of the legs. No anal tubercles. No scale at base of uropod. Gills 5 plus 1 arthrobranch on mxp. 3, and 2 epipods (on mxp. 1 and 2). Eggs often large, and the development abbreviated.

Remarks.—All three South African species possess the ventral prolongation of the frontal margin below the rostrum. This character

is used in Coutière's 1909 group-key to separate the *paulsoni* and *brevicarpus* groups. That, however, does not imply that it does not occur in other groups. Reference to Coutière's 1899 work (p. 76, fig. 35) shows that it is found in certain species of the *neomeris* and *biunguiculatus* groups. But, as Stebbing remarked (1915, *l. c.*, p. 86, in regard to the relative lengths of ant. 1 and 2), there seems to be a "conspiracy of silence" in the descriptions of species to omit all reference to the subrostral character.

Key to the South African Species.

Rostrum with ventral prolongation (fig. 139, *e*).

1. Dactyls of 3rd–5th legs biunguiculate, the ventral tooth shorter than the dorsal one (fig. 139, *d*) . . . *anisocheir.*
2. Dactyls biunguiculate, the ventral tooth obviously larger than the dorsal one (fig. 139, *i*, *k*).
   - *a.* Both teeth on dactyl acute . . . . . cf. *jedanensis.*
   - *b.* Both teeth spatulate . . . . . *charon.*

Synalpheus anisocheir Stebb.

Fig. 139, *a–d.*

1915. Stebbing, *l. c.*, p. 86, pl. 23 (Crust., pl. 87).

Rostrum with ventral prolongation. Supra-orbital spines almost as prominent as rostrum. 1st joint of ant. 1 subequal to 2nd plus 3rd, basal process extending to middle of 2nd joint. 2nd joint of ant. 2 with outer and inner (lower and upper) spines, spine of antennal scale extending almost to end of 3rd peduncular joint, and beyond apex of the lamellar part. Wrist of smaller 1st leg not longer than its apical width; small chela without brush of setae on finger. No projecting tooth on apex of 6th joint (overhanging articulation of finger) of larger 1st leg in type and some specimens, but in others (irrespective of age or sex) a well-marked triangular tooth; in one Durban specimen this tooth is acute and curves downwards towards the finger (*cf.* fig. 139, *h*). 1st jointlet of wrist of 2nd leg about as long as 2nd–4th jointlets together, 5th longer than any of the 3 preceding ones. 3rd–5th legs without spines on 4th joint; 6th joint of 5th leg in addition to marginal spines with oblique series of serrate spines in distal $\frac{2}{3}$ of outer (hinder) surface; dactyls biunguiculate, the ventral tooth shorter than but approximately as wide at base as the dorsal one. Telson with 2 pairs

of dorso-lateral spinules, anterior pair at middle of length, 2 unequal spines in notch on either side of the gently convex apical margin.

Length ♀ up to 26 mm., ova 2 mm. diam.



Fig. 139.—*Synalpheus anisocheir* Stebb. *a*, carapace. *b*, dorsal view of rostrum and bases of 1st and 2nd antennae. *c*, inner view of chela of 1st leg ♀, with tooth at end of hand as developed in some specimens. *d*, posterior view of dactyl and apex of 6th joint of 5th leg.

Synalpheus, cf. *jedanensis* de Man. *e*, lateral view of rostrum and supra-orbital spines, ventral prolongation dotted. *f*, view obliquely from in front and from below of rostrum, showing ventral prolongation, and eyes. *g*, dorsal view of aberrant rostrum. *h*, apex of 1st chela. *i*, dactyl of 3rd–5th legs.

Synalpheus charon (Heller). *j*, antennal scale. *k*, inner view of dactyl of 3rd–5th legs, with ventral view of apex further enlarged.

Localities.—Gordon's Bay, False Bay (Stebbing); Durban, and Natal and Zululand coast, littoral to 40 fathoms (S. Afr. Mus.). The University of Cape Town Ecological Survey has found this species at Langebaan, Saldanha Bay.

Remarks.—A few dissected parts of Stebbing's type specimen remain, and I have seen several juv. and ovig. ♀♀ from the other localities. The species is not unlike *hululensis* Cout. 1909.

Synalpheus, cf. *jedanensis* de Man

Fig. 139, *e–i*.

1911 and 1915. de Man, *l. c.*, p. 222, pl. 7, figs. 27, 27, *a–c*.
1922. *Id.*, *l. c.*, p. 27.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 389.

Rostrum with ventral prolongation, and supra-orbital spines as in *anisocheir*. Antennae and chelipeds as in *anisocheir*, but larger chela of 1st leg with an acute tooth on apex of 6th joint overhanging articulation of finger. 3rd–5th legs, including serrate spines on 6th joint of 5th leg, as in *anisocheir*, but 4th joint of 3rd leg with 4 spines and 4th joint of 4th leg with 3 spines on lower margin. Dactyls biunguiculate, but the ventral tooth obviously larger than the dorsal one. Telson with the anterior pair of spines in front of middle.

Length ♀ up to 17 mm.

Locality.—Delagoa Bay, 4 fathoms (Gilchrist's Survey, 2 ovig. ♀♀ and one with aberrant rostrum).

Remarks.—One of the specimens, otherwise in agreement with the 2 ovig. ♀♀, has the rostrum much shorter than the supra-orbital spines (fig. 139, *g*). I think this is to be regarded as a casual aberration or the result of an early injury.

Synalpheus charon (Heller)

Fig. 139, *j*, *k*.

1861. Heller, SB. Ak. Wiss. Wien, xliv, p. 272, pl. 3, figs. 21, 22 (*Alpheus c.*).
1875. Paulson, Red Sea Crustacea, p. 104, pl. 13, figs. 4, 4, *a–g* (*Alpheus c.*).
1899. Coutière, *l. c.*, p. 263, figs. 331, 332, 332 *bis*.
1905. *Id.*, *l. c.*, p. 873.
1911 and 1915. de Man, *l. c.*, p. 245, pl. 8, figs. 37, 37, *a–c*.
1921. Coutière, *l. c.*, p. 416.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 389.

Rostrum and supra-orbital spines as in *anisocheir*. Antennae also as in *anisocheir*, but lamellar portion of antennal scale broader, and no upper (outer) tooth on 2nd joint. 1st legs missing. No spines on lower margin of 4th joint of 3rd and 4th legs; 6th joint of 5th leg as in *anisocheir*; dactyls stout, with 2 unguiform or cowl-like teeth,

the smaller upper one with small subapical point on inner side. Telson with anterior pair of spines at middle of length.

Length ♀ 22 mm.

Locality.—Delagoa Bay (presumably) (Lourenzo Marques Mus., 1 ♀).

Distribution.—Red Sea, Maldives and Laccadives, Chagos, East Indies, Hawaiian Is.

Remarks.—The dactyls of 3rd–5th legs seem to be quite distinctive, but the unguis proper is not quite like Coutière's figs. 332, 332 *bis*, or Paulson's.

Gen. Alpheus Fabr.

1784. Fabricius, Mantissa Insect (*fide* Coutière, *l. c.*, 1899, pp. 6, 55).

1795. Weber, Nomencl. Entom. sec. syst. Fabr., p. 91.

1798. Fabricius, Entom. Syst. Suppl., pp. 380, 404.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 829, pl. 4, fig. 2 (epipods).

1891. Brooks and Herrick, Mem. Nat. Ac. Sci. Washington, v (development).

1899. Coutière, *l. c.*, *passim*, definition, p. 336; division into groups, p. 351.

1901. Alcock, Cat. Ind. Deep-sea Crust. Macrura, p. 139.

1910. Stebbing, *l. c.*, p. 388.

1911 and 1915. de Man, *l. c.*, pp. 299 *sqq.* (key to groups, list of Indo-Pacific species and key), and plates.

1927. Gurney, *l. c.*, p. 263 (larva).

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 126.

1938. Gurney, *l. c.*, pp. 44 *sqq.* (larvae).

Rostrum absent, or if present small. Front more or less rounded, supra-orbital spines if present small, hind margin of carapace notched. Eyes completely concealed, orbits more or less complete. Ant. 1 short, 1st joint and basal process reduced. Antennal scale not strongly developed, sometimes reduced to the spine only. 1st pair of legs unusually large, robust, and more or less strongly asymmetrical; 6th joint with impressed line (*linea impressa*) proximally delimiting an oval-triangular space (fig. 144, *d*, *e*); finger more or less external, always a small round polished area above the articulation fitting against a similar area on apex of 6th joint when the finger is extended (Coutière: plaques adhesives) (figs. 140, *h*, *l*; 144, *d*, *n*). No movable scale at base of uropod. Telson with well-developed anal tubercles (fig. 144, *b*). Gills 5, plus 1 arthrobranch, and 8 epipods (sometimes also a rudimentary pleurobranch on mxp. 3 (fig. 144, *c*)). Eggs

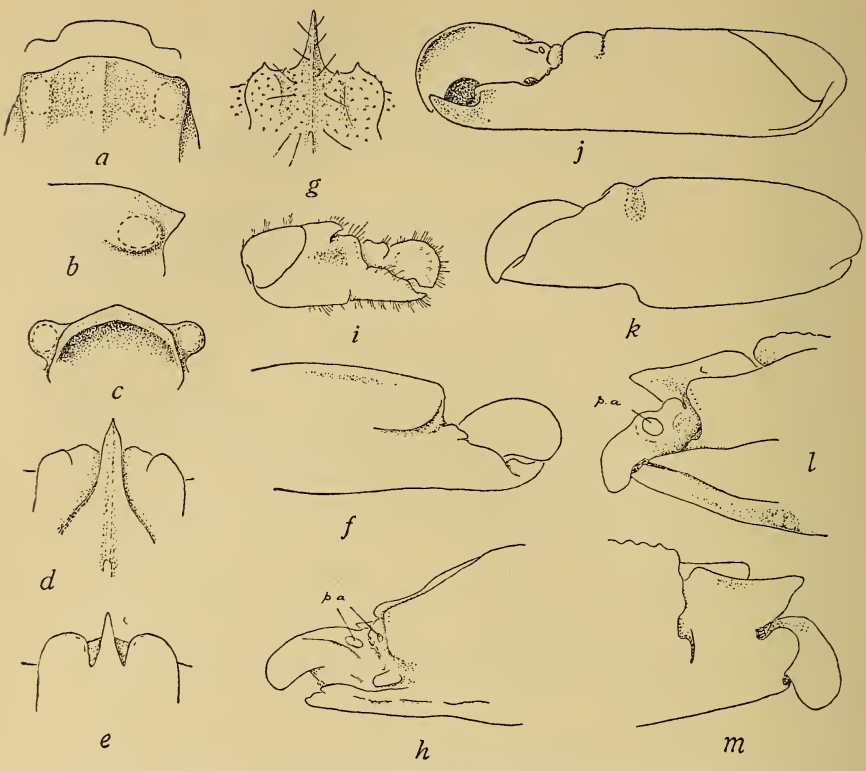


Fig. 140.—*Alpheus frontalis* M. Edw. Mauritius. *a*, dorsal view of front of ♀, with outline of same of ♂. *b*, lateral view of same, ♀. *c*, front view of same, ♀.

Alpheus insignis Heller. Mauritius. *d*, dorsal view of front (after de Man, 1902).

Alpheus macrochirus Richters. Mauritius. *e*, dorsal view of front. *f*, upper surface of large chela, setae omitted (both figures after Coutière, 1899).

Alpheus villosus (Oliv.). Mauritius. *g*, dorsal view of front. *h*, lower surface of large chela (both figures after Coutière, 1899).

Alpheus hippothoë de Man. Zanzibar. *i*, lower surface of large chela (after de Man, 1888).

Alpheus gracilipes Stimpson. Dar-es-Salaam. *j*, upper surface of large chela (after Coutière, 1899).

Alpheus leviusculus Dana. Mauritius. *k*, upper surface of large chela (after de Man, 1915).

Alpheus deuteropus Hilg. Zanzibar. *l*, *m*, upper and lower surfaces of apical portion of large chela (after Coutière, 1899).

(*p.a.*, polished areas, plaques adhesives.)

moderate or sometimes rather large; in most species a *Zoea* larva, but in some cases this stage is passed within the egg and the development is abbreviated.

Remarks.—The epipod on mxp. 3 consists of a short rod with hooked apex; the epipods on 1st–4th legs consist each of an anterior

setiferous tubercle and a posterior rod (Coutière: α and β resp.); the epipod on 5th leg consists only of the setiferous tubercle (not counted as an epipod by Alcock). One or more of the long filiform setae on one leg may be clasped by the hook on the preceding leg (fig. 144, *c*).

In some species the finger of the small chela is described as "Balaeniceps"-like (fig. 144, *f*). The lateral margins curve upwards and meet on the upper surface some little distance from the actual apex, and are densely clothed with setae, thus resembling the upper jaw of a Baleen-whale.

Habits, etc.—Cracker-shrimps derive their name from the noise produced by suddenly closing the finger and thumb of the large chela (Coutière, *l. c.*, 1899, p. 536).

All the species live concealed, either in definite burrows in mud-banks, or under rocks and amongst the crevices of corals. *A. frontalis* M. Edw. (Cuvier, Règne Anim. Crust., pl. 53, fig. 2), from Mauritius, lives in felted tubes made by Oscillariae (Richters, 1880).

The genus has not been recorded from the west coast of South Africa south of the Cameroons. On the south coast of South Africa the most westerly locality is Breede River estuary.

Classification.—Coutière (1899, *l. c.*, p. 351) and de Man (1911, *l. c.*, p. 307) have grouped the very numerous species into 5 groups, one of which is subdivided into 3. As these groups are characterized more by *combinations* of characters than mutually exclusive characters, they are not utilized here for purposes of the key. A list of the species, grouped according to the divisions of Coutière and de Man, is given.

In the key I have endeavoured to include also the species recorded from Mauritius (Richters, 1880) and Zanzibar (Hilgendorf, 1878), as some of these have already been recorded from South Africa, and eventually perhaps others also will be found within our limits.

The identification of specimens is no easy matter, particularly because the chelae so often break off and are lost, and collections often contain two or more species mixed up in one bottle with detached chelae and legs. Hence in the key the characters of the chelae are subordinated as far as possible to the less deciduous characters of the rostrum and hinder legs.

A. gracilis is not included, because I consider Stebbing's identification very uncertain. Certain features only, and those not all of great importance, are mentioned by Stebbing, and his figures do not supply the deficiencies (1919, Ann. Durban Mus., ii, p. 123, pl. 20). The true *gracilis* has biunguiculate dactyls on 3rd–5th legs. Stebbing's

specimen is not unlike *facetus* de Man. I have seen a specimen from St. Lucia Bay which apparently corresponds with Stebbing's specimen. It has a white medio-dorsal stripe, alternately broad and constricted, on the abdomen; spine on outer ramus of uropod pale; dactyls of 3rd–5th legs simple. But the chelae are missing; there are no supra-orbital spines.

Some other specimens, also from St. Lucia Bay, may be the true *gracilis*. They have 2 brown transverse bands on the carapace, a transverse brown band on each abdominal segment, and the spine on outer ramus of uropod black. The dactyls of 3rd–5th legs are biunguiculate, and supra-orbital spines are present; but the chelae are missing.

To help identification of the Mauritian and other species included in the key, and which may later be found in South African waters, figures are given of most of the species included in the key.

List of Species.

South African Species marked *.

Group *megacheles.*

deuteropus Hilg. Zanzibar.

Group *macrochirus.*

* *lottini* Guer. (*ventrosus* M. Edw.).
villosus (Oliv.). Mauritius.
macrochirus Richters. Mauritius (Coutière, 1899, p. 32, ? = *sulcatus* Kingsley).
* *luciae* Brnrd.
? *gracilis* Heller.

Group *crinitus—obesomanus.*

obesomanus Dana. Mauritius.

Group *crinitus—insignis.*

* *dissodontonotus* Stebb.
gracilipes Stimpson. Dar-es-Salaam.
insignis Heller. Mauritius.

Group *crinitus—crinitus.*

* *longecarinatus* Hilg.
frontalis M. Edw. Mauritius.

Group *brevirostris*.

* *rapacida* de Man.
* *notabilis* Stebb. ? in this group.

Group *edwardsii*.

* *bisincisus* de Haan.
* *crassimanus* Heller.
* *edwardsii* (Aud.).
* *malabaricus* Fabr.
* *parvirostris* Dana.
* *rapax* Fabr.
* *strenuus* Dana.
hippothoë de Man. Zanzibar (Hilgendorf: *pacifica*, non Dana. See Coutière, p. 32).
leviusculus Dana. Mauritius.

Key to the South African [Mauritian, etc.] Species.

Frontal margin broad, no rostrum (fig. 140, *a–c*) . . . [*frontalis*].
Rostrum, or at least a rostral point, present.
I. 2nd jointlet of wrist of 2nd leg at least twice as long as 1st jointlet (fig. 141, *d*).
A. Front rather broad. Apical joint of mxp. 3 oval (fig. 141, *c*) . . . . . *longecarinatus*.
B. Front narrow. Apical joint of mxp. 3 narrow. Finger of large chela hammer-head-shaped . [*obesomanus*].
II. 2nd jointlet of wrist of 2nd leg not longer than 1st jointlet.
A. Telson constricted in distal half. Chela (presumably the smaller chela) slender and elongate, palm 1½ times as long as finger . . . . *notabilis*.
B. Telson not markedly constricted, more or less broad.
1. Supra-orbital spines present (fig. 141, *e*).
a. Dactyls of 3rd–5th legs peculiar, short, stout (fig. 141, *h*, *i*) . . . *lottini*.
b. Dactyls of 3rd–5th legs simple . . [*deuteropus*].
c. Dactyls of 3rd–5th legs biunguiculate . *gracilis*.
2. No supra-orbital spines. Dactyls of 3rd–5th legs biunguiculate . . . . . [*macrochirus*].
3. No supra-orbital spines. Dactyls of 3rd–5th legs simple.
a. A flat tooth on either side of base of rostrum behind eyes (fig. 141, *k*) . . *dissodontonotus*.
b. No tooth flanking rostrum.
i. Outer margin of hand of large chela entire, not grooved . . *rapacida*.
ii. A narrow furrow across outer margin of hand of large chela (figs. 140, *j*, 142, *h*).

α. Rostral keel flanked by open grooves (fig. 140, *g*). Finger of small chela ♂ subulate . . . *rapax*.

β. Rostrum arising from a triangular flattened base between orbital hoods (fig. 140, *d*). Finger of small chela ♂ Balaeniceps-like.

* 4th joint of 3rd leg with apical tooth . . [*insignis*].

** 4th joint of 3rd leg without tooth . [*gracilipes*].

iii. An open groove across outer margin of hand of large chela (figs. 143, 144), sometimes feeble.

α. 4th joint of 3rd leg with tooth on lower distal margin.

* Carapace villose. An acute tooth on rostral keel at base of orbital hoods (fig. 140, *g*) . . [*villosus*].*

** Carapace glabrous. Rostral keel unarmed.

§ Basal joint of ant. 2 with ventral spine . . *parvirostris*.

§§ Basal joint of ant. 2 without ventral spine . [*hippothoë*].

β. 4th joint of 3rd leg without tooth. 4th joint of large chela with apical (or subapical) tooth on inner (upper) margin.

* Small chela Balaeniceps-like in ♂ only.

§ Rostrum subulate, more or less keeled dorsally.

† Margins of palm of large chela ending bluntly *crassimanus*.

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* Minute supra-orbital spines present.

†† Margins of palm ending more or less acutely *edwardsii*.

§§ Rostrum dorsally flattened . *bisincisus*.

** Small chela Balaeniceps-like in both sexes . . . *strenuus*.

*** Small chela not Balaeniceps-like.

§ Transverse groove on inner surface of palm of large chela extending as a longitudinal groove (fig. 142, *m*) . *malabaricus*.

§§ Transverse groove U-shaped, not extending into a longitudinal groove (fig. 140, *k*) . [*leviusculus*].

γ. 4th joint of 3rd leg without tooth. 4th joint of large chela without apical tooth on inner margin . . *luciae*.

Alpheus longecarinatus Hilg.

Fig. 141, *a–d*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 833, pl. 4, figs. 3–7.
1911. de Man, *l. c.*, p. 315 (in key).
1921. Coutière, *l. c.*, p. 426.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 389.

Frontal margin broad, evenly convex, rostrum short, triangular, keel extending backwards $\frac{2}{3}$ length of carapace, flanked on orbital hoods by shallow depressions. Carapace with scattered setae, chiefly anteriorly. No supra-orbital spines. Basal process of ant. 1 short,

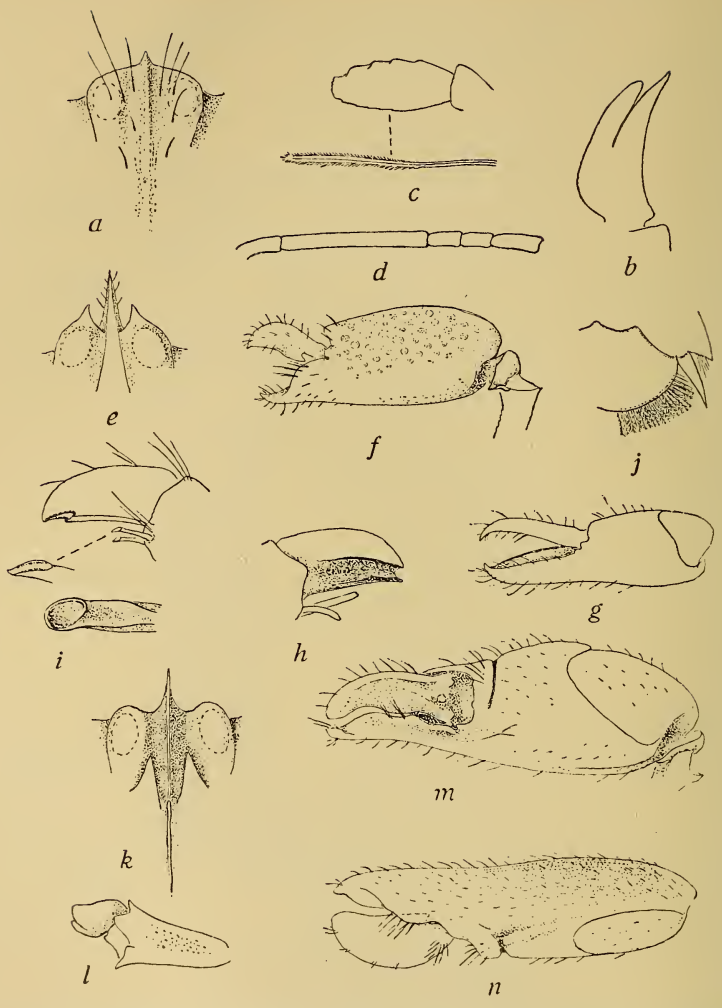


FIG. 141.—*Alpheus longecarinatus* Hilg. *a*, dorsal view of front. *b*, antennal scale, setae omitted. *c*, apical joint of mxp. 3, setae omitted, but one seta further enlarged. *d*, wrist of 2nd leg.

Alpheus lottini Guer. *e*, dorsal view of front. *f*, inner (upper) surface of chela. *g*, outer (lower) surface of smaller chela. *h*, outer surface of dactyl of 3rd and 4th legs. *i*, dactyl of 5th leg, with full view of ventral surface, and apex of a spine on 6th joint further enlarged. *j*, outer ramus of uropod, plumose setae cut short.

Alpheus dissodontonotus Stebb. *k*, dorsal view of front. *l*, upper (inner) view of 4th and 5th joints of large chela. *m*, lower surface of large chela, true profile of hand, but finger in oblique view. *n*, view of large chela from outer (lower) edge, showing true profile of finger and thumb, palm edge-on.

not reaching end of 1st joint. Basal joint of ant. 2 without ventral (external) spine; spine of antennal scale extending to end of 5th joint, lamellar portion a little shorter. Apical joint of mxp. 3 ovate-lanceolate but apically obtuse, with long setae. 4th joint of larger cheliped with tooth on inner margin, hand without transverse or longitudinal grooves; finger and thumb of smaller chela shorter than palm, not gaping. Wrist of 2nd leg with 2nd jointlet twice (Hilgendorf) or thrice (present specimen) as long as 1st, 5th a trifle longer than 1st, 3rd and 4th subequal, chela subequal to 4th plus 5th. 3rd–5th legs rather stout, movable spine on 3rd joint of 3rd and 4th legs unusually conspicuous, 4th joint with apical tooth, 5th joint with 3–4 spines and an apical tooth on lower margin; 6th joint on 5th leg with 5 spines on lower margin and only 2–3 small groups of serrulate spines distally; dactyls simple. Telson $1\frac{1}{2}$ times as long as basal width. Diaeresis of outer ramus of uropod curving towards base and then straight across towards inner margin. Arthrobranch on mxp. 3 smaller than in other species, no rudimentary pleurobranch. Eggs moderately large.

Length ♂ 20 mm., ovig. ♀ 22 mm. (Hilgendorf: ♀ 25 mm.).

Locality.—Delagoa Bay (Gilchrist's Survey).

Distribution.—Zanzibar; Amirante and Providence Groups.

Remarks.—Apparently this species has not been observed since its original description. It is therefore particularly unfortunate that neither of the present specimens has either the large or small chelae. The identity, however, is scarcely in doubt. The description of the chelae above is taken from Hilgendorf. He said there was a spine on the "trochanter" (3rd joint) of all legs. Such spines are present normally in *Alpheus* species on the 3rd and 4th legs, but I have not observed them on either the 1st, 2nd or 5th legs.

A. alcyone de Man 1902 (syn. *aculipes* Cout. 1905) is closely allied and very likely synonymous; it has biunguiculate dactyls on 3rd and 4th legs, and the lamellar portion of antennal scale much shorter than the spine.

Alpheus notabilis Stebb.

1915. Stebbing, *l. c.*, p. 80, pls. 20, 21 (Crust., pls. 84, 85).

1919. *Id.*, Ann. Durban Mus., ii, p. 122.

Stebbing (1915) compared the chela with Bate's *longimanus* (Japan), and later suggested that *notabilis* might be the same as *acutocarinatus* de Man (East Indies). The imperfection of the single specimen leaves its specific identity uncertain.

Rostrum subulate, setose, its keel extending $\frac{2}{3}$ length of carapace. No supra-orbital spines. Basal joint of ant. 2 with very short ventral spine; spine of antennal scale as long as the narrow lamellar part. Only one, presumably the smaller, of the 1st pair of legs known, palm nearly $1\frac{1}{2}$ times as long as finger, 8 times as long as wide, finger and thumb slender, subulate. No tooth on 4th joint in 3rd and 4th legs. Dactyls of 3rd–5th legs slender, acute. Telson $2\frac{1}{2}$ times as long as basal width, constricted in distal half, apical width half the basal width, apical margin strongly convex.

Length 30 mm.

Locality.—Delagoa Bay (Stebbing, and S. Afr. Mus.).

Remarks.—Two non-ovigerous ♀♀, smaller than the type and in poor condition, were collected by Gilchrist's Survey. With them, but disconnected, are two of the 3rd (or 4th) legs, and a slender chela resembling Stebbing's figure.

Alpheus lottini Guérin

Fig. 141, *e–j*.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 834 (*laevis* Randall).

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 555, pl. 99, fig. 3 (*laevis*).

1899. Coutière, *l. c.*, p. 429, pl. 5, fig. 1 (*laevis*) (*Zoea* stage).

1911. de Man, *l. c.*, pp. 311 (in key), 339 (*ventrosus*) (references).

1915. Stebbing, *l. c.*, p. 82 (references).

1919. *Id.*, Ann. Durban Mus., ii, p. 123.

1938. Gurney, *l. c.*, p. 44, figs. 193–198 (*ventrosus*) (larva).

Rostrum acute, somewhat triquetral in cross-section, more or less flattened dorsally, flanked by rather deep grooves. Supra-orbital spines present. Basal process of ant. 1 extending beyond apex of 1st joint. Lamellar portion of antennal scale extending to end of 5th joint, spine a little beyond. 1st pair of legs, no great difference in size between larger and smaller chelae, both chelae relatively smaller in ♀ than in ♂, 4th joint stouter in smaller than in larger chela, in both with tooth on inner apex, outer apex sharply rectangular but not produced, palm in both chelae smooth on both inner (upper) and outer (lower) surfaces, without transverse grooves, margins entire, "molar" process of finger of larger chela subcylindrical and obliquely truncate, finger of smaller chela subtriquetral. Wrist of 2nd leg with 1st jointlet longest, 2nd, 3rd and 4th subequal, or 2nd slightly longer or 4th slightly shorter than either of the other two resp., 5th a little

longer than 4th, chela subequal to 1st jointlet. 3rd–5th legs stout, especially the 3rd and 4th, no tooth on 4th joint of 3rd or 4th legs; dactyls of 3rd and 4th legs short, stout, grooved on outer surface causing a bidentate apex; dactyl of 5th leg grooved ventrally, with (in lateral view) subacute apex; 6th joint of 5th leg with only 4 groups of serrulate spines distally. Telson $1\frac{1}{2}$ times as long as basal width, latter $2\frac{1}{3}$–$2\frac{1}{2}$ times apical width. Outer ramus of uropod with strong spine (usually dark in colour) on outer margin at diaeresis, the line of which is scalloped. No rudimentary pleurobranch on mxp. 3. Eggs small and numerous.

Length ♀ up to 41 mm., smallest ovig. ♀ 19 mm. Pale olive or yellowish, with a darker orange or purplish stripe medio-dorsally, chelae deep orange with reddish spots on both upper and lower surfaces, especially towards the outer margin.

Localities.—Durban and Delagoa Bay (Stebbing); Delagoa Bay (coll. K. H. B. 1912; C. J. van der Horst).

Distribution.—Mauritius, Madagascar, Zanzibar, Red Sea, Seychelles, Indo-Pacific to California.

Remarks.—Distinguished from all other South African species by the dactyls of 3rd–5th legs and the presence of supra-orbital spines. It seems to prefer living among corals, where both Dr. C. J. van der Horst and myself found it at Delagoa Bay.

Stebbing (1915) thought that Bate's *Challenger* figure could not be easily reconciled with this species; but Bate's figures are known to be slightly inaccurate sometimes, and the synonymy is accepted by de Man. Bate's figure of the chela with its spots agrees with the present specimens.

Alpheus dissodontonotus Stebb.

Fig. 141, *k–n.*

1915. Stebbing, *l. c.*, p. 83, pl. 22 (Crust., pl. 86).

Rostrum spiniform, keeled, the keel extending back $\frac{2}{3}$ length of carapace, flanked on either side by a deep but rather broad groove, from the hind end of which projects a flat tooth extending forwards to level of hind margin of eye, an inconspicuous tubercle on the keel between bases of the two dorsal teeth. No supra-orbital spines. Basal process of ant. 1 reaching to end of 1st joint, latter without apical teeth. Spine of antennal scale extending slightly beyond lamellar part, which reaches to or slightly beyond apex of 5th joint. 1st pair of legs similar in both sexes (large and small chelae resp.), but

smaller in ♀ than in ♂; 4th joint with spiniform tooth on inner apex in larger chela, outer apex acutely produced in large and small chelae; owing to torsion (about 40°), finger and thumb of large chela lie in a different plane from that of palm, finger opening obliquely downwards (and outwards), palm with deep narrow transverse groove across outer margin, from which a shallow longitudinal groove runs proximally on inner (upper) surface, finger apically blunt, "molar" process flattened; small chela as in *crassimanus* ♀, finger and thumb subequal to palm, finger terete, slightly triquetral owing to a slight ridge on outer margin, less marked in ♀ than in ♂. 1st jointlet of wrist of 2nd leg a little longer (in type, but very little so in 2 other specimens) than 2nd, 3rd and 4th subequal, each shorter than 5th, chela very slightly shorter than 1st jointlet. 3rd–5th legs as in *crassimanus*, but a subapical tooth on lower margin of 4th joint in 3rd and 4th legs; dactyls simple. Telson as in *crassimanus*. Eggs rather large. (Rudimentary pleurobranch on mxp. 3 not determined with certainty.)

Length ♀ up to (approx.) 44 mm.

Localities.—Algoa Bay, 20 fathoms (Stebbing); Algoa Bay, 10 fathoms (S. Afr. Mus.); from stomach of Brotulid fish (*Bidenichthys capensis*), Still Bay (S. Afr. Mus.).

Remarks.—Differs from *bidens* (Oliv.) and *praedator* de Man in the dorsal teeth extending to level of hind margin of eyes, and the absence of denticles on upper apex of 1st peduncular joint of antenna 1 (*cf.* de Man, *l. c.*, pl. 17, figs. 80, 81).

Alpheus rapacida de Man

Fig. 142, *a–f.*

1908. de Man, Notes from Leyden Mus., xxx, p. 105.

1911 and 1915. *Id.*, *l. c.*, p. 394, pl. 20, fig. 91.

1921. Stebbing, Ann. Durban Mus., iii, p. 18.

Rostrum sharply triangular, flanked anteriorly by rather deep grooves, keel extending backwards to about middle of carapace. No supra-orbital spines. Basal process of ant. 1 extending to end of 1st joint. Lamellar portion of antennal scale extending distinctly beyond apex of 5th joint, but the spine only just exceeding the lamellar portion. Larger cheliped, 3rd and 4th joints serrulate on inner margin, the latter joint with apical tooth on inner and on outer margin, all topped with movable spinules; palm (to base of finger) about twice as long as wide, whole chela $3\frac{1}{3}$ (to nearly 3 according to de Man) times as long as wide, no transverse or longitudinal grooves, outer

edge somewhat flattened distally between a slight ridge from finger-hinge to the *linea impressa* and the narrow setiferous groove which extends the whole length of margin, a similar setiferous groove on

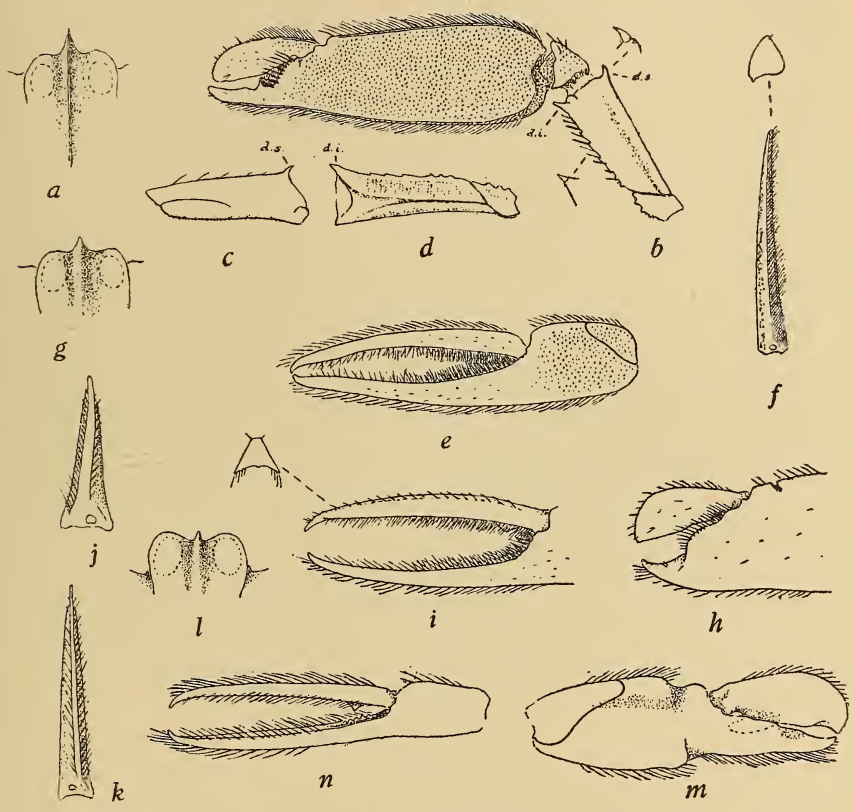


FIG. 142.—*Alpheus rapacida* de Man. *a*, dorsal view of front. *b*, inner (upper) view of large chela ♂. *c*, outer surface of 4th joint of same. *d*, lower surface of 3rd and 4th joints of same. *e*, outer (lower) view of small chela ♂. *f*, outer edge of finger of same, with cross-section.

Alpheus rapax Fabr. *g*, dorsal view of front. *h*, apex of large chela ♂. *i*, apex of small chela ♂, with cross-section of finger. *j*, *k*, outer edge of finger of large and small chelae respectively.

Alpheus malabaricus Fabr. *l*, dorsal view of front. *m*, lower (outer) view of large chela ♀. *n*, lower view of small chela ♀.

inner margin extending to apex of thumb, and a similar one on finger, "molar" process very little projecting, concave; 4th joint granulate on lower surface and on edge of margin bordering the narrow groove (fig. 142, *d*), 5th granulate on upper surface, 6th and base of finger granulate on both surfaces, tips of finger and thumb smooth; smaller

chela, 3rd and 4th joints as in larger chela, palm about $1\frac{1}{2}$ times as long as wide, and half length of finger, finger and thumb ensiform, slender, gaping, inner margins setose, especially proximally, outer and inner margins of hand with setiferous groove and granulation as in larger chela. Wrist of 2nd leg with 2nd jointlet slightly longer than 1st, 5th only slightly longer than 3rd or 4th, which are subequal, chela a little longer than 5th jointlet. 3rd and 4th legs without tooth on 4th joint; dactyl of 3rd leg half length of 6th joint, shorter in 4th leg; 5th leg with serrulate spines on 6th joint extending half-way to base of joint. Telson twice as long as its greatest width, latter not twice the apical width, apical margin convex.

Length ♂ 60 mm., large and small chelae (3rd joint to apex) resp. 42 and 40 mm. ♂ brownish pink, irrorated with paler marks, cephalic groove paler, abdomen with 3 longitudinal sublateral and lateral stripes on each side of the darker median stripe; upper (inner) surfaces of chelae greenish brown mottled with paler, lower surface pale, finger and thumb of large chela orange; wrist and chela of 2nd legs violet; longer flagellum of antenna 1, and setae on mxp. 3. orange-sienna; 3rd–5th legs buff (Delagoa Bay specimen in formalin).

Localities.—Durban (Stebbing); off Zululand coast, 26 fathoms, and Delagoa Bay (S. Afr. Mus.).

Distribution.—East Indies, 0–36 metres.

Remarks.—Closely resembling *rapax* Fabr., but distinguished by the absence of a transverse groove on larger chela, and the outer edge of finger in both chelae sharp-edged with only a single row of setae in a fine groove.

Alpheus rapax Fabr.

Fig. 142, *g–k*.

1798. Fabricius, Syst. Entom. Suppl., p. 405.

? 1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 832 (*malabaricus*, non Fabr.).

1909. de Man, Mem. Soc. zool. Fr., xxii, p. 147, pl. 7, figs. 1–8 (synonymy).

1911. *Id.*, *l. c.*, pp. 322 (in key) and 385.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121 (*laps. cal.* credited to de Haan).

[Not *rapax* de Haan, nor Bate, nor Coutière, 1905.]

Very like *rapacida*. Rostrum short, triangular, flanked by rather deep grooves, but keel not extending back beyond limits of orbital

hoods. The spine of antennal scale extending beyond the lamellar portion, and both extending beyond 5th joint, the lamellar portion very narrow, scarcely as wide as spine. Larger cheliped, inner margin of 4th joint feebly serrulate, no apical tooth, no tooth on outer apex, hand similar to that of *rapacida*, but less elongate, with a distinct transverse groove or furrow on outer edge distally, outer edge of finger distinctly flattened and smooth between 2 rows of setae; smaller chela in general similar to that of *rapacida* but finger in ♂ feebly "Balaeniceps"-like, the setose edges approaching but not meeting near the apex, the outer edge flattened between 2 rows of setae as in larger chela. Finger of the smaller chela in cross-section quite different from that of *rapacida* (*cf.* fig. 142, *f*, *i*, *k*). Rudimentary pleurobranch present on mxp. 3.

Length ♂ 30 mm. (de Man: ♂ 51 mm., ♀ 46 mm.).

Locality.—Delagoa Bay (coll. K. H. B. 1912).

Distribution.—Zanzibar (if Hilgendorf's record is correctly interpreted), Red Sea, Mergui Archipelago, East Indies.

Remarks.—I have seen only 1 ♂ and 1 non-ovig. ♀. These specimens appear to correspond with *rapax* as described by de Man, but Coutière's figure of the smaller chela (1899, *l. c.*, fig. 284), with which de Man said his specimens corresponded, seems to be more noticeably "Balaeniceps"-like than in the present ♂. The outer edges of the fingers of both chelae is a feature not figured (unfortunately) by de Man.

Alpheus parvirostris Dana.

Fig. 143, *e–i*.

1852. Dana, U.S. Explor. Exp., Crust., p. 551, pl. 35, fig. 3.

1905. Coutière, *l. c.*, p. 906.

1911 and 1915. de Man, *l. c.*, pp. 330 (in key) and 432, pl. 23, figs. 106, 106, *a* (frontal region and small chela).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 389.

Rostrum narrow, acute, on either side of which the frontal margin is obtusely prominent, keel feeble, not extending backwards beyond orbital hoods. No supra-orbital spines. Basal joint of ant. 2 with strong inferior spine extending at least to middle of 2nd peduncular joint of ant. 1; spine of antennal scale extending at least to end of 5th joint (of ant. 2), lamellar portion narrow and considerably shorter. 4th joint of both large and small chelipeds (♂) with a sharp tooth on inner upper margin, not at but a little distance proximal to

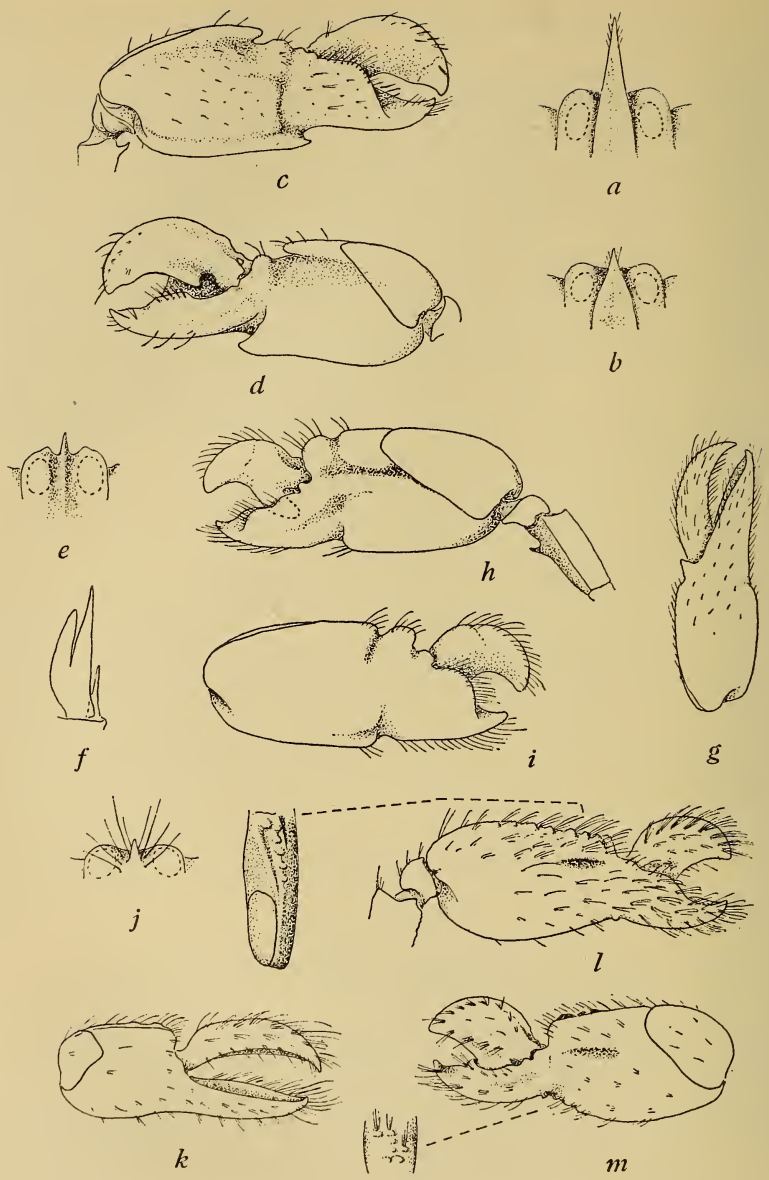


FIG. 143.—*Alpheus bisincisus* de Haan. *a*, *b*, dorsal view of front of ♂ and ♀ respectively. *c*, *d*, upper and lower surfaces respectively of large chela ♂. *Alpheus parvirostris* Dana. *e*, dorsal view of front. *f*, antennal scale. *g*, small chela ♂. *h*, *i*, lower and upper surfaces respectively of large chela ♂. *Alpheus luciae* Brnrd. *j*, dorsal view of front. *k*, lower surface of small chela ♂. *l*, *m*, upper and lower surfaces respectively of large chela ♂, with vertical views of outer and inner edges of hand.

apex, outer apex rectangular, not produced; hand of large chela with open transverse groove on outer edge, outer and inner margins ending bluntly (not produced), a deep longitudinal groove on lower (outer) surface between the transverse groove and the *linea impressa*, no longitudinal groove on inner (upper) surface; finger strong, blunt, "molar" process very strong; hand of small chela with nearly entire margins, finger and thumb about equal to palm, a rather prominent tooth on inner (upper) surface overlapping base of finger, finger rather strong, triquetral in cross-section, not "Balaeniceps"-like. Wrist of 2nd leg with 1st jointlet nearly twice as long as 2nd, 5th slightly shorter than 2nd, 3rd and 4th shortest, subequal, chela subequal to 1st jointlet. 3rd–5th legs with simple dactyls; 4th joint of 3rd and 4th legs with subapical tooth on lower margin. Telson with apical margin only slightly convex.

Length 13 mm.

Locality.—Mozambique (Island) (coll. K. H. B. 1912).

Distribution.—Red Sea, Maldives and Laccadives, Indo-Pacific to Japan.

Remarks.—Coutière (1905) stated that the species is widely distributed in the Indo-Pacific "depuis le Cap jusqu'aux îles Sandwich." I have not traced a record from "the Cape."

I have not seen Dana's original description and figures. Three ♂ specimens were taken amongst coral in rock-pools together with ♀♀ of *edwardsii* (K. H. B.).

Coutière (1899, *l. c.*, p. 32) identified Hilgendorf's *pacificus* (non Dana) with *hippothoë* de Man, but it might just as well be identified with *parvirostris* until Hilgendorf's material is re-examined.

Alpheus luciae Brnrd.

Fig. 143, *j–m.*

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 389.

Rostrum very short, setose, separated by deep but short grooves from the orbital hoods, which do not extend far backwards and are separated from pterygostomial portion of carapace only by shallow grooves. No supra-orbital spines. Basal process of ant. 1 reaching to end of 1st joint. Basal joint of ant. 2 with strong ventral spine; lamellar portion of antennal scale not extending as far as spine, the latter not quite reaching end of 5th joint. Apical joint of mxp. 3 elongate. 1st leg, no tooth on inner margin of 4th joint, hand of large chela with short deep longitudinal groove on both lower and upper

surfaces, inner margin with pairs of rounded tubercles near base of thumb, outer margin with 7–8 similar tubercles distally (the proximal ones obscure), finger strong, outer margin forming a smooth blunt keel between tufts of setae, whole chela with tufts and single setae, especially on upper surface. Wrist of 2nd leg with 1st jointlet subequal to 2nd plus 3rd, 3rd and 4th subequal, 5th shorter than 2nd, chela subequal to 2nd jointlet. 3rd–5th legs stout, especially the 3rd and 4th, 4th joint of 3rd and 4th legs without tooth on lower margin, 6th joint with 7 strong spines on lower margin; 6th joint of 5th leg with 6 spines, serrulate spines extending $\frac{2}{3}$ towards base; all dactyls simple. Telson $1\frac{1}{2}$ times as long as basal width. Diaeresis on outer ramus of uropod scalloped. Rudimentary pleurobranch present on mxp. 3.

Length 32 mm.

Locality.—St. Lucia Bay, Zululand (S. Afr. Mus.).

Remarks.—From the robustness of the chelae the single specimen would appear to be a ♂, but there is no appendix masculina on pleopod 2.

Apparently closely allied to *macrochirus* Richters (Mauritius, etc.), but with simple (not biunguiculate) dactyls. It resembles *idiocheles* Cout. 1905 in the stout 3rd and 4th legs, but the rostrum is different, and the large chela entirely different.

Alpheus crassimanus Heller

Fig. 144.

Common Cracker-shrimp.

? 1843. Krauss, Südafrik. Crust., p. 55 (*edwardsii*, non Aud., non M. Edw.).

1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 554, pl. 99, figs. 2, 2, *k* (large [*sic*] chela).

1899. Coutière, *l. c.*, pp. 238, etc., fig. 293 (small chela), p. 434 (development).

1902. de Man, Abh. Senckenb. Ges., xxv, p. 880, pl. 27, figs. 62, 62, *a* (large chela).

1910. Stebbing, *l. c.*, p. 389 (also *edwardsii* Krauss).

1911. de Man, *l. c.*, pp. 328 (in key) and 417.

1915. Kemp, Mem. Ind. Mus., v, p. 299.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.

Rostrum short, triangular, its keel extending only a little beyond

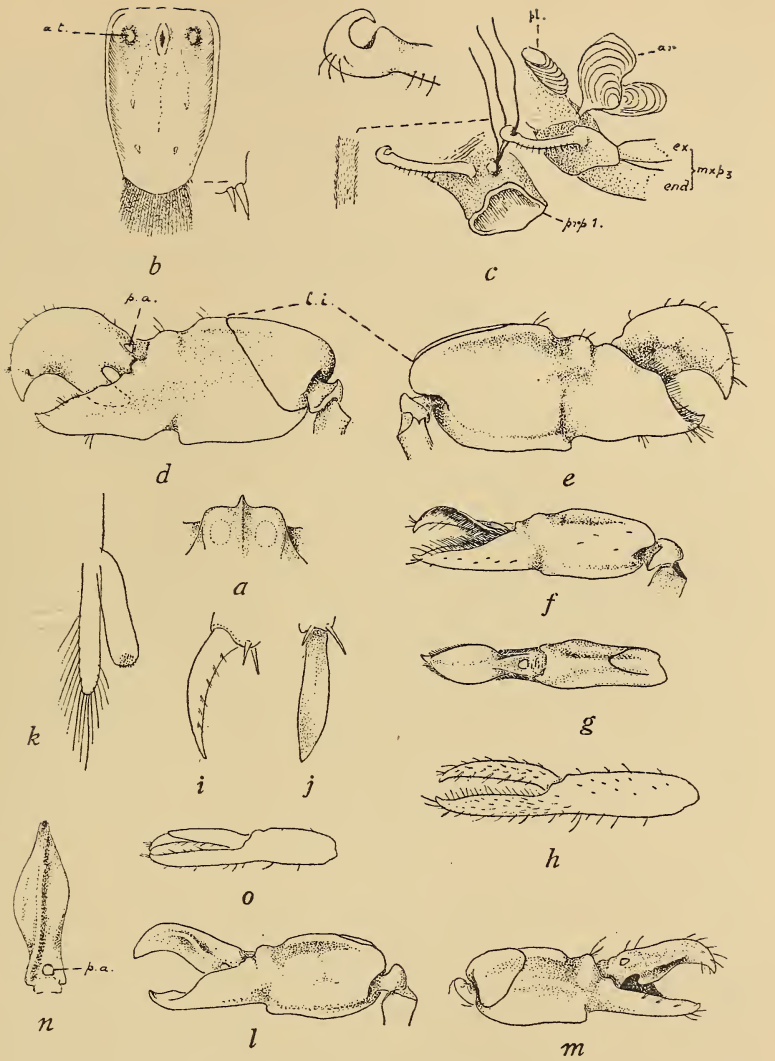


Fig. 144.—*Alpheus crassimanus* Heller. *a*, dorsal view of front. *b*, ventral view of telson to show anal tubercles, spines on dorsal surface dotted. *c*, bases of mxp. 3 and 1st leg, to show arthrobranch and rudimentary pleurobranch on former, and epipods, apex of rod and a portion of a filamentous seta further enlarged. *d*, *e*, outer and inner views of large chela. *f*, *g*, inner surface and outer edge of small chela ♂. *h*, small chela ♀. *i*, *j*, outer (lateral) and ventral views of dactyl of 3rd and 4th legs. *k*, pleopod 2 ♂.

Aberrant specimen from Knysna. *l*, *m*, upper and lower surfaces of large chela (right side) ♂. *n*, outer edge of finger of same, upper surface to the left. *o*, small chela of same specimen.

ar., arthrobranch. *a.t.*, anal tubercle. *end.*, *ex.*, endopod and exopod of mxp. 3. *l.i.*, linea impressa. *p.a.*, polished area. *pl.*, pleurobranch (rudimentary). *prp.* 1, 1st leg.

hind margin of eyes, with shallow open groove on either side. No supra-orbital spines. Basal process of ant. 1 not reaching apex of 1st joint. Spine of antennal scale reaching apex of 5th joint, lamellar part slightly shorter than spine. Large chela similar in ♂ and ♀, but smaller in the latter, 4th joint with sharp tooth on inner apex (fig. 144, *e*), outer apex not produced, outer and inner margins of palm ending bluntly before the transverse grooves, groove on inner (upper) surface extending proximally as a triangular depression, "molar" process of finger very strong, bluntly conical; small chela in ♂ "Balaeniceps"-like, no tooth on apex of 4th joint, finger flattened, beak-like, oval in external view, with thick marginal brushes of setae meeting behind the pointed apex, inner surface with sharp median keel, flanked with setae, thumb with thick marginal brushes, inner surface with sharp, slightly convex cutting-edge; in ♀ finger and thumb slightly longer than palm, terete, each with a sharp cutting-edge. 2nd leg about 1½ times length of carapace, wrist with 1st jointlet longest, 2nd longer than 5th, 3rd and 4th shortest, subequal, each shorter than 5th, chela subequal to 2nd jointlet. 3rd–5th legs becoming successively more slender; 3rd and 4th legs with a movable spine on lower surface proximally on 3rd joint, lower apex of 4th joint not acute or prominent, lower margin of 6th joint spinose and setose; dactyls on 3rd and 4th legs slender, ventrally concave; on 5th leg the 6th joint with transverse series of serrulate spines extending more than half-way from apex to base, dactyl narrower and more terete than on 3rd and 4th legs. Telson about 1½ times as long as broad, 2 pairs of dorsal spinules, anterior pair at about middle of length, postero-lateral corners not spiniform, with 2 unequal spines, apical margin gently convex. Diaeresis across outer ramus of uropod straight. Rudimentary pleurobranch present on mxp. 3. Eggs small and numerous.

Length ♂ up to 52 mm., ♀ 55 mm. In a ♂ 50 mm. long the large chela (base of 6th joint to apex of closed finger) measures 30 mm. with a width of 14 mm., in a ♀ of equal size 22 and 11 mm. resp. Smallest ovigerous ♀ observed (Delagoa Bay) 33 mm. Greeny-brown, olive-green, or smoky-grey, anterior parts of abdominal segments often white (producing a banded appearance), with or without longitudinal stripes (a median and 2 lateral) on each segment, the lower lateral stripe runs along the lower margins of the pleurae and is often edged with black, a black spot in middle of the side on segments 2 and 4; telson and uropods apically blackish (turning red in alcohol); chelae greeny-orange or greeny-brown, finger and thumb of large chela

orange, tips dull violet, palm with a more or less brilliant cobalt-blue patch on inner (upper) surface; other legs dull pinkish (K. H. B., *cf.* Kemp, 1915).

Localities.—Zwartkops estuary, Algoa Bay (Stebbing); Delagoa Bay (Barnard); estuaries of the Breede River (Port Beaufort), Kaffirkuils River (Still Bay), Keurbooms River (Plettenberg Bay), and Zwartkops River, Knysna lagoon and estuary, Port St. Johns, Umzimkulu River (Port Shepstone, Natal), Durban Bay, Delagoa Bay (S. Afr. Mus.).

Distribution.—Nicobar Is., coasts of India, East Indies, Red Sea, N. Australia.

Remarks.—Bate has mistaken the small chela for the large one; Heller figured only the smaller chela of ♂.

As this is the commonest species of Cracker-shrimp on the South African coast, it is probable that Krauss' material should be identified as *crassimanus*.

Aberration (fig. 144, *l–o*).—Along with many normal specimens from Knysna lagoon there is one ♂ specimen which appears to be an aberration of *crassimanus*; or it may represent a stage in regeneration after injury (*cf.* Wilson, 1903, Biol. Bull., iv, pp. 197–210). ♂ 52 mm. large chela 24 mm. (on right side); no spine on inner apex of 4th joint of 1st leg (as in *normal small* cheliped), finger beak-like with strong median keel and a lateral keel on each side; small chela as in normal small chela of ♀, but finger with only a slight indication of the lateral ridges and no marginal brushes of setae.

Alpheus edwardsii (Aud.)

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 830, pl. 4, fig. 2 (epipods).

1902. de Man, Abh. Senckenb. Ges., xxv, p. 880, pl. 27, fig. 62, *b*, *c* (large chela).

1905. Coutière, *l. c.*, pp. 911, 912, pl. 86, figs. 50, 50, *a*, *b*.

1911. de Man, *l. c.*, pp. 327 (in key) and 414 (notes under *audouini*).

1927. Hale, S. Austral. Crust., pt. 1, p. 47 (*Crangon e.* var.).

[Not *edwardsii* M. Edw., nor Dana, nor Bate; probably not Krauss.]

Differs from *crassimanus* in having both margins of palm of large chela ending acutely (and more or less overhanging the transverse grooves; see de Man's figure (1902), and cf. *bisincisus*), and the margins of palm of small chela (♂) almost straight (not notched in profile).

Length smallest ovig. ♀ (Mozambique) 14 mm.

Localities.—Mozambique and Inhambane (Hilgendorf); off Zululand coast, 13 fathoms (S. Afr. Mus.); Durban, St. Lucia Bay, Delagoa Bay, Mozambique (S. Afr. Mus.).

Remarks.—At Mozambique the specimens were found amongst corals in rock pools (K. H. B. 1912).

Parasites.—A branchial parasite (*Bopyrella* sp.) was found in a specimen from Delagoa Bay.

Alpheus strenuus Dana

1852. Dana, U.S. Explor. Exp., Crust., p. 543, pl. 34, fig. 4.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 831.

1901. Lanchester, Proc. Zool. Soc. Lond., ii, p. 563 (*lobidens*, non de Haan).

1905. Coutière, *l. c.*, p. 913, pl. 87, figs. 53, 53, *a*, *b*.

1911. de Man, *l. c.*, pp. 329 (in key), 425.

Differs from *crassimanus* in having a more prominent rostrum, the 2nd leg more than 1½ times length of carapace (sometimes twice length of carapace), and the small chela in ♀ resembling that of ♂ (*i.e.* "Balaeniceps"-like).

Locality.—Mozambique (Hilgendorf).

Distribution.—Red Sea, Maldives and Laccadives, East Indies, Pacific Islands.

Alpheus bisincisus de Haan

Fig. 143, *a–d*.

1849. de Haan, Fauna Japon., Crust., p. 179, pl. 45, fig. 3.

1905. Coutière, *l. c.*, pp. 910, 911 (var. *malensis*, pl. 86, figs. 48, 48, *a–d*).

1911 and 1915. de Man, *l. c.*, p. 405, pl. 22, fig. 95, and var. *variabilis*, p. 406, pl. 22, fig. 95, *a*.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 390.

Rostrum flattened and feebly concave dorsally, no median keel, apex acute, setose, longer and narrower in ♂ than in ♀, flanked by deep grooves. No supra-orbital spines. Basal process of ant. 1 reaching apex of 1st joint. Large chela as in *crassimanus* but both margins of palm ending in blunt projections, "molar" process of finger flattened; similar in both sexes, but smaller in ♀; small chelae as in *crassimanus* ♂ and ♀ respectively. Chela of 2nd leg subequal to 1st jointlet of wrist. Other characters as in *crassimanus*.

Length ♂ 23 mm., ovig. ♀♀ 16–32 mm.

Localities.—Off Umtwalumi (north of Port Shepstone), Natal, 25 fathoms, and Durban Bay (S. Afr. Mus.).

Distribution (including varieties).—Japan, New Caledonia, East Indies, Maldives and Laccadives.

Remarks.—Variation in the proportions of the chelae have led to the institution of two or three varieties. The typical form, with which the present specimens seem to agree best, has the length of large chela 2·2–2·5 times the length of the finger. Neither Coutière nor de Man indicate any sexual difference in the size of the rostrum.

Alpheus malabaricus Fabr.

Fig. 142, *l–n*.

1798. Fabricius, Syst. Entom. Suppl., p. 405.

1893. Henderson, Trans. Linn. Soc. Lond., 2nd ser. zool., v, p. 434, pl. 40, figs. 1–3.

1911 and 1915. de Man, *l. c.*, p. 429, pl. 23, figs. 105 (varieties).

1915. Kemp, Mem. Ind. Mus., v, p. 301.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 390.

[Not *malabaricus* de Haan, nor Ortmann, nor Hilgendorf.]

Rostrum very small, scarcely extending beyond level of the rather prominent rounded orbital hoods, no keel. No supra-orbital spines. Basal process of ant. 1 not quite reaching apex of 1st joint. Lamellar portion of antennal scale rather broad, reaching to apex of 5th joint, spine scarcely projecting farther. Large chela ♀, 4th joint with tooth on inner apex, margins of palm ending bluntly, "molar" process of finger large, bluntly conical; small chela ♀, 4th joint without tooth on inner apex, palm about 1½ times as long as wide, finger and thumb at least 2⅔ times as long as palm, straight or nearly so, sometimes slightly gaping, terete, finger with 1 largish tooth in middle of inner surface basally, thumb with several denticles in the corresponding position. Wrist of 2nd leg with 1st and 2nd jointlets subequal, 5th slightly longer than either 3rd or 4th, which are subequal. 3rd–5th legs, no spine on 4th joint of 3rd or 4th legs, all dactyls simple. Telson about 1⅔ times as long as greatest width. Rudimentary pleurobranch present on mxp. 3 (♀). Eggs small and numerous.

Length ♂ 30 mm. (Henderson), ♀ (Delagoa Bay) 27 mm. Semi-transparent with reddish transverse bars, 4 on carapace and 7 on abdomen, internal organs showing through integument as blackish-green masses, tip of telson and uropods deep blue, chelae dull greenish,

dotted with reddish brown, tips of fingers and thumbs fawn or pink, 3rd–5th legs yellow (Kemp).

Locality.—Delagoa Bay (Gilchrist's Survey).

Distribution.—Coasts of India, East Indies, Japan.

Remarks.—The tooth at base of finger of small chela is not always present. Both large and small chelae are alike in the ♂ and ♀, though relatively smaller in the latter.

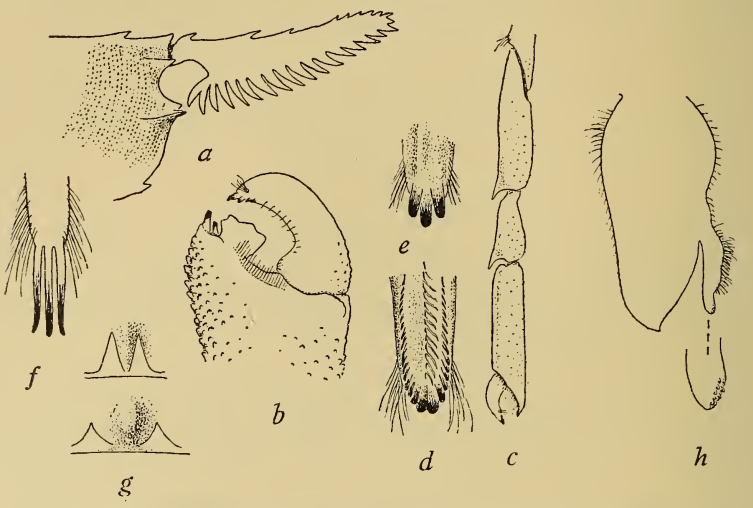


Fig. 145.—*Rhynchocinetes durbanensis* Gordon. *a*, front of carapace with rostrum. *b*, apex of chela of 1st leg of adult ♂. *c*, 1st leg of juv. ♂. *d*, *e*, inner view of apex of finger and thumb of chela of juv. ♂. *f*, apex of thumb of chela of 2nd leg. *g*, 2nd and 3rd thoracic sternites. *h*, endopod of pleopod 1 ♂.

Family RHYNCHOCINETIDAE.

1917. Stebbing, Ann. Durban Mus., ii, p. 26.

1939. Burkenroad, Ann. Mag. Nat. Hist. (xi), 3, p. 310 (systematic position).

Rostrum compressed, dentate, more or less movably articulated with front of carapace. Lateral (horizontal or oblique) pleural sutures on anterior abdominal segments often present (in adult). Antennal spine present, supra-orbital present or absent. Eyes conspicuous, on short stalks. Mandible with incisor process and 3-jointed palp. Mxp. 2 with apical joint attached laterally to 6th joint. Mxp. 3 with exopod and epipod. Exopods absent from all legs; epipods present on all except the 5th. 1st pair of legs robust,

equal or unequal, chelate. 2nd pair of legs slender, equal, chelate, wrist not segmented. Telson tapering. Gills 10–11 plus 7 epipods. Pleopod 1 with appendix interna on endopod in ♂, sometimes also (abnormally) in ♀.

Gen. Rhynchocinetes M. Edw.

1917. Stebbing, *l. c.*, p. 26 (references).

1925. Kemp, Rec. Ind. Mus., xxvii, p. 263.

1927. Hale, S. Austral. Crust., pt. 1, p. 54.

1936. Gordon, Proc. Zool. Soc. Lond., i, p. 75 (revision, key to species).

1939. Burkenroad, *l. c.*, p. 310 (habits and larval stages).

1941. Gurney, J. Linn. Soc. Lond., xli, p. 113, figs. 8–10 (larval stages and systematic position).

1941. Hale, B.A.N.Z. Antarct. Res. Exp., B, iv, pt. 9, p. 269.

The only genus, with the above characters, is remarkable for the articulated and movable rostrum. This feature is paralleled by *Pantomus* in the *Pandalidae*. In the Madeiran species *rigens* Gordon the articulation is incomplete and movement restricted. An appendix interna on 1st pleopod ♂ is also an unusual feature. The 3rd maxillipeds and 1st pair of legs are often elongated in old males (Kemp, p. 264).

Five species are known from the Indo-Pacific (incl. west coast of S. America) and one from the Atlantic. Brightly coloured with spots or linear markings.

Rhynchocinetes durbanensis Gordon

Fig. 145.

1917. Stebbing, *l. c.*, p. 27, pl. 6 (*typus*, non M. Edw.).

1936. Gordon, *l. c.*, p. 83, figs. 5, *b*, *c*, 7, *c*, *d*.

Integument finely striate. Carapace with 2 post-rostral teeth, supra-orbital, antennal and pterygostomial spines present, orbit bounded below by a small angular projection above the antennal spine. Rostrum with 3 spaced teeth proximally and 7 distally above, 16–17 teeth below. Abdomen strongly humped at 3rd segment, no lateral sutures on 1st–3rd segments, no tooth on hind margin laterally on 4th and 5th segments. Spiniform tooth on outer apex of 1st peduncular joint of ant. 1 reaching to end of 2nd joint, basal process not reaching so far, about to middle of 2nd joint. Exopod of mxp. 3

extending to middle of antepenultimate joint (of mxp. 3). 1st leg, upper apices of 4th and 5th joints acute, upper margin of 6th bluntly carinate, finger and thumb gaping when closed, apices with dark stout spines, 3 on thumb, several decreasing in size proximally on finger, 3rd–6th joints granulate especially in adult ♂. 2nd leg slender, finger and thumb armed as in 1st leg but spines relatively longer, those on thumb almost as long as thumb itself. 3rd–5th legs, 3rd and 5th joints each with 1 movable adpressed spine on lower surface, 4th joint with 4 spines; dactyls biunguiculate, with 3 spinules on lower margin. Pleopod 1 ♂ with appendix interna, with coupling-hooks; pleopod 2 ♂ with the appendix interna longer than the appendix masculina. Telson with 3 pairs of dorso-lateral spinules. No arthrobranch on segment of 4th leg. 2nd and 3rd sternites each with 2 slender triangular teeth, set transversely, those on 3rd sternite farther apart than those on 2nd.

Length ♂ up to 77 mm. (Gordon). A Durban specimen after a month in formalin was pinkish with linear markings and ocelli (as in Stebbing's figure) of a darker red or red-brown, the colour deepest on the bands converging on the hump of 3rd abdominal segment; eye-stalks red, cornea black; antennal scale white with red external margin; uropods pink with darker external margins; legs pink, basal joints with darker bands; peduncles of pleopods red.

Locality.—Durban (Stebbing, Gordon; and S. Afr. Mus.).

Remarks.—Stebbing's figure shows a specimen, presumably ♂, in which the right 1st leg is robust, with relatively short wrist, and expanded hand, the finger almost semicircularly curved (whether the left was similar was not mentioned). A ♂, 75 mm. long, has the 1st pair of legs equal, granulate, with the finger curved, and a strong tooth-like process on the thumb (fig. 145, *b*).

Family GNATHOPHYLLIDAE.

1917. Borradaile, Trans. Linn. Soc. Lond., 2nd ser. zool., xvii, p. 408 (characters).

1920. de Man, Siboga Exp. monogr., xxxix *a*, 3, p. 187 (list of genera and species).

Carapace broad, abdomen humped. Rostrum compressed, serrate. Only the antennal spine present on carapace. Basal process of ant. 1 well developed; outer flagellum thickened basally, with very short cleft at end of thick part. Antennal scale apically rounded. Mandible simple, without incisor process or palp. Mxp. 2 with 7th joint

attached laterally to, or fused with, 6th joint. Mxp. 3 with some or all of the joints broadly expanded, with exopod and epipod. No exopods or epipods on legs. 1st and 2nd pairs of legs chelate, more or less dissimilar, the 2nd pair the larger, with unsegmented wrist. Telson with 2 pairs of lateral spines, apex with 2 pairs of unequal spines and a median pair of plumose setae. Gills 6 plus 3 epipods (a vestige of a pleurobranch on mxp. 3, as well as the arthrobranch, in *Hymenocera*).

Key to the South African Genera.

1. 3rd and 4th joints of mxp. 3 fused, broad. Outer flagellum of ant. 1 thick but not foliaceous . . . . *Gnathophyllum.*
2. 3rd and 4th joints of mxp. 3 articulated, the three terminal joints (4th–6th) foliaceous. Outer flagellum of ant. 1 foliaceous. Hand of 2nd leg with foliaceous expansion *Hymenocera.*

Gen. Gnathophyllum Latr.

1819. Latreille, Nouv. Dict. Hist. Nat., 2nd ed., xxx, p. 72 (*Gnatophyllum* [sic], emend. Desmarest 1823).

1917. Borradaile, *l. c.*, p. 409.

1920. de Man, *l. c.*, pp. 187, 188.

1920. Stebbing, Ann. Durban Mus., ii, p. 275.

1940. Armstrong, Amer. Mus. Novit. no. 1096, p. 6 (key to species).

Rostrum short. 3rd and 4th joints of mxp. 3 fused, with notch on inner margin, broadly expanded, 5th and 6th joints small. The 2nd, 3rd, and 4th joints of mxp. 2 thick and muscular, the sutures obscure, 7th joint obsolete or indistinguishably fused with the scimitar-like 6th, inner margin of which bears a double row of palisade-like spines. No foliaceous expansions on 2nd legs. Outer flagellum of ant. 1 thick but not foliaceous. Mandible cylindrical. Dactyls of 3rd–5th legs biunguiculate.

Gnathophyllum fasciolatum Stimpson

Zebra Shrimp.

Fig. 146.

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 28.

1880. Richters, Meeresf. Mauritius, p. 161, pl. 17, figs. 18–20, 22 (*zebra*).

1917. Borradaile, *l. c.*, p. 409, pl. 59, figs. 8, *a–d* (mouth-parts).

1920. de Man, *l. c.*, p. 189, pl. 16, figs. 48, 48, *a–e.*

1920. Stebbing, *l. c.*, p. 275 (*americanus* Guérin).

1925. Balss, D. Tiefsee Exp., xx, p. 294 (*americanum*).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 84, figs. 7–9 (*americanum*).

1940. Armstrong, *l. c.*, pp. 6, 7, 8 (in key), fig. 4, A, B (ant. 1, scaphocerite) (*americanum*).

Rostrum compressed, on a broad triangular base, 5 teeth dorsally excluding the apex, the hindmost tooth in front of hind margin of

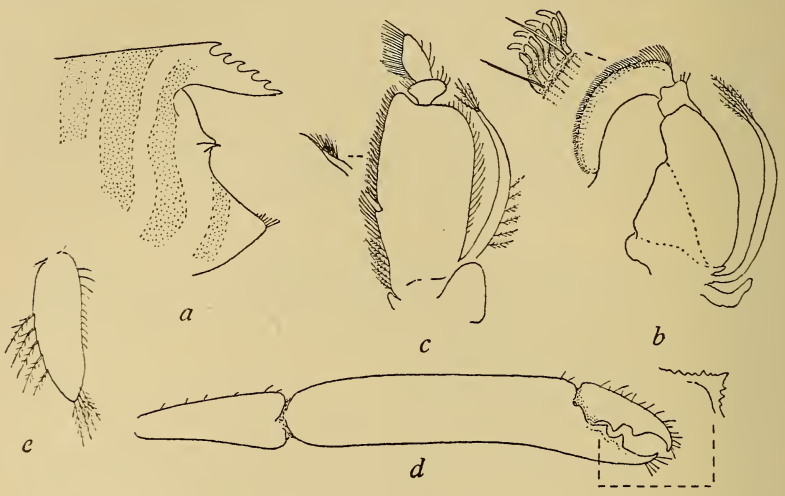


Fig. 146.—*Gnathophyllum fasciolatum* Stimpson. *a*, front of carapace and rostrum. *b*, 2nd maxilliped, with portion of margin of apical joint further enlarged. *c*, 3rd maxilliped. *d*, 2nd leg ♂. *e*, endopod of pleopod 1 ♂.

orbit, often a minute denticle near the tip ventrally. Antennal spine distinct, antero-lateral corner of carapace prominent. Outer flagellum of ant. 1 thicker and more densely setose in ♂ than in ♀. 1st legs extending beyond antennal scale by about the length of chela. 2nd legs much longer, especially in ♂, hand elongate, finger and thumb in ♀ and immature (or small-sized) ♂ with entire or feebly denticulate cutting-edges, in large ♂ each with 2 strong teeth, the proximal one on thumb being serrate.

Length up to 20 mm. (Stimpson), Mauritian specimens 15 mm. Buff or brownish or reddish with darker (dark red to blackish) transverse bars, 6 on carapace; 6th abdominal segment and tail-fan pale, legs and hands of large chelae with dark bands across middle of the joints, cornea black.

Localities.—Port St. Johns (S. Afr. Mus.); Durban (Stebbing); St. Lucia Bay, and Delagoa Bay (S. Afr. Mus.).

Distribution.—Mauritius, Seychelles, Chagos, Red Sea, East Indies, Pacific.

Remarks.—Regarded by some authors as synonymous with *americanum* from the Gulf of Mexico. Armstrong has compared specimens from the Pacific and West Indies and finds no significant difference, and therefore follows Nobili (1907) and Rathbun (1901) in regarding *americanum* as circumtropical. See Holthuis, 1949, Zool. Med., xxx, p. 244, figs. 5, 6 (*americanum*).

Gen. Hymenocera Desm.

1823. Desmarest, Dict. Sci. Nat., xxviii, pp. 259, 275.

1917. Borradaile, *l. c.*, pp. 409, 410.

1920. de Man, *l. c.*, pp. 188, 191.

Rostrum well developed. Mandible flattened. 3rd joint of mxp. 3 narrow, movably articulated with 4th, 4th–6th joints (or only 5th and 6th) expanded, foliaceous. 2nd and 3rd joints of mxp. 2 not clearly distinct, but 4th–7th distinctly articulated. Outer flagellum of ant. 1 foliaceous. 1st legs with hand slender, styliform, finger and thumb short and feeble. 2nd legs strong, hands with foliaceous expansions on inner margins. Dactyls of 3rd–5th legs biunguiculate.

Hymenocera elegans Heller

Fig. 147.

1861. Heller, SB. Ak. Wiss. Wien, xliv, p. 264, pl. 3, figs. 9–14.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 828.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 822, pl. 25, fig. 52 (spines on mxp. 3).

1917. Borradaile, *l. c.*, p. 410, pl. 59, fig. 10, *a–f* (mouth-parts).

1920. de Man, *l. c.*, p. 191, pl. 16, fig. 49 (tail-fan).

1942. Ward, Mauritius Inst. Bull., ii, p. 58.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 390.

Rostrum with 7 (6–8) teeth above, the hindmost 3 in adult (2 in juv.) being really post-rostral (on the carapace), 1 or 2 below (excl. apical point). Basal process of ant. 1 reaching to middle or nearly to end (excl. spine on outer apex) of 1st peduncular joint. 4th–6th joints of mxp. 3 foliaceous, 4th wider than 3rd, 5th widest, shape not exactly alike on the two sides. 4th and 5th joints of 2nd leg with 2 apical spines, 6th joint with spine on outer apex, finger serrate, whole inner margin of palm and thumb with foliaceous expansion (not symmetrical on the two legs). Pleurae of 1st and 2nd (and to a lesser extent 3rd

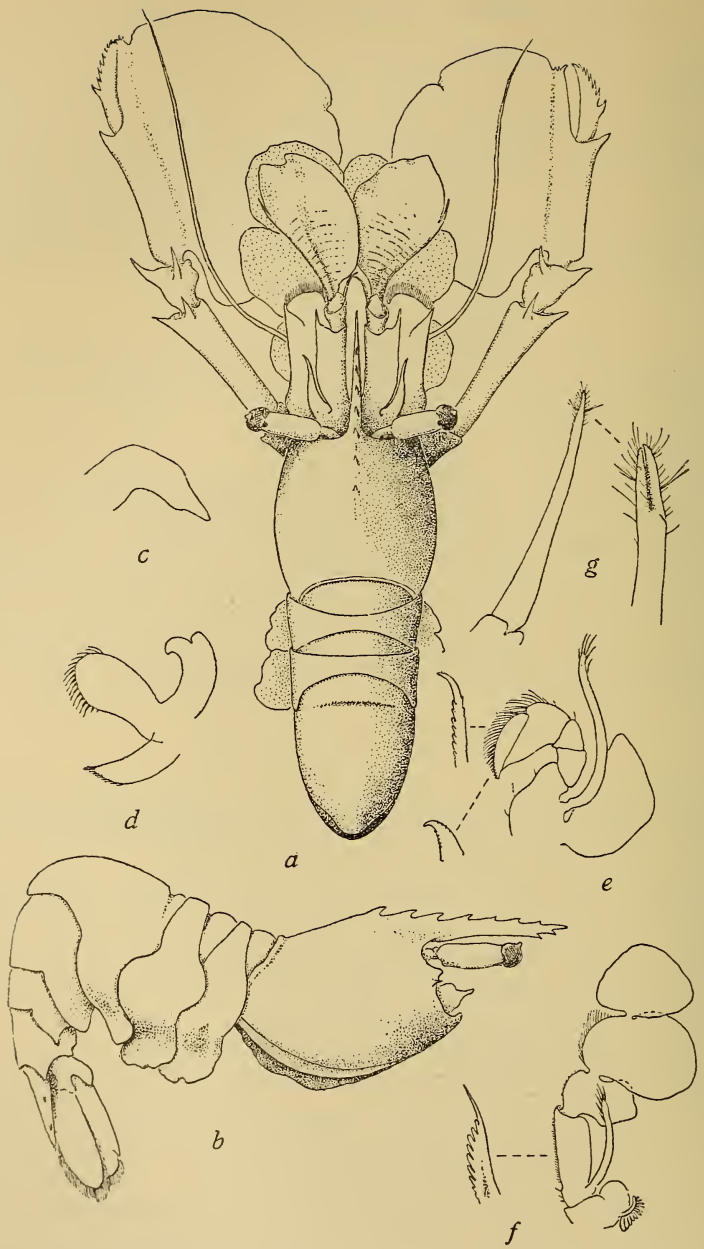


FIG. 147.—*Hymenocera elegans* Heller. *a*, dorsal view, lobes of the 3rd maxillipeds lightly dotted, projecting pleurae of 1st and 2nd abdominal segments partly omitted on right side. *b*, lateral view. *c*, mandible. *d*, 2nd maxilla. *e*, 2nd maxilliped with marginal spines further enlarged. *f*, 3rd maxilliped (right side), with marginal spine further enlarged. *g*, hand of 1st leg, with finger and thumb further enlarged in lateral view.

also) abdominal segments curved outwards, somewhat foliaceous, with irregular margins.

Length ♂ up to 40 mm. (de Man), ♀ up to 55 mm. (Hilgendorf). Semi-transparent with dirty grey spots (Heller); with blue ocelli (Hilgendorf).

Locality.—Delagoa Bay (coll. C. J. van der Horst, 1 ♂, 1939).

Distribution.—Red Sea, Seychelles, Chagos, Matemmo (presumably Matema Is., near Ibo, Portuguese East Africa), East Indies.

Remarks.—Hilgendorf recorded his specimens from under stones. Professor van der Horst also found his specimen under a stone: "it was a most beautiful animal and moved its chelae, etc., slowly and constantly, making an impression of floating leaves."

Family PALAEMONIDAE.

1900. Coutière, Ann. Sci. Nat., ser. 8, xii, p. 249 (wrongly dated in Stebbing, 1910 and 1915).

1910. Stebbing, *l. c.*, p. 383.

1915. *Id.*, Ann. S. Afr. Mus., xv, p. 72.

1917. Borradaile, Trans. Linn. Soc. Lond., 2nd ser. zool., xvii, pp. 323 *sqq.* (*Pontoniinae*).

1922. Kemp, Rec. Ind. Mus., xxiv, pp. 113 *sqq.* (key to genera of *Pontoniinae*).

1923. Sollaud, Bull. Biol. Fr. Belg., lvii, p. 509 (development of *Palaemoninae*).

1924. Gurney, "Terra Nova" Rep., zool., viii, p. 120 (larval stages).

1925. Kemp, Rec. Ind. Mus., xxvii, pp. 284 *sqq.* (key to genera of *Palaemoninae*).

1938. Gurney, Gt. Barrier Reef Exp. Rep., vi, pp. 1–44 (larval stages).

1941. Gurney and Lebour, J. Linn. Soc. Lond., xli, p. 135 (larval stages).

Rostrum compressed, usually dentate. Carapace with antennal, with or without hepatic and branchiostegal spines. Eyes well developed. Mandible with or without palp, incisor process and molar separated by a cleft. Mxp. 2 with 7th joint attached laterally to 6th. Mxp. 3 with exopod, with or without arthrobranch and pleurobranch. 1st legs with small chelae (in one Pontoniine genus, *Thaumastocaris*, the wrist is segmented). 2nd legs with larger and more robust chelae, wrist unsegmented. No epipods on legs. Telson tapering. Gills 6–7 plus 2 epipods.

Remarks.—The family includes marine, estuarine, and purely fluviatile species. The River Prawns are tropical and subtropical.

Key to the South African Genera.

I. Ant. 1 with 3 flagella. Mxp. 3 with pleurobranch. Telson with 4 apical spines (*Palaemoninae*).
  A. Mandible with palp.
    1. Hepatic spine usually present, branchiostegal spine absent (fig. 148, *a*, *i*). Fluviatile and estuarine . . . . . *Palaemon.*
    2. Hepatic spine absent, branchiostegal spine usually present (fig. 149, *a*, *l*). Marine, estuarine, fluviatile . . . . . *Leander.*
  B. Mandible without palp. Hepatic and branchiostegal spines present. Rostrum dentate . . . [*Palaemonetes*].

II. Ant. 1 with 2 flagella (outer one only slightly cleft). Mxp. 3 without pleurobranch. Telson with 6 apical spines (*Pontoniinae*). Mandible without palp in S. African genera.
  A. Dactyls of 3rd–5th legs simple or biunguiculate, without basal protuberance (fig. 151, *e*).
    1. Rostrum curving downwards, smooth (fig. 150, *a*). In bivalve Mollusca (*Pinna*) . . . *Anchistus.*
    2. Rostrum straight, dentate.
      a. Carapace not depressed. Free-living or associated with Sea Anemones . *Periclimenes* subgen. *Ancylocaris.*
      b. Carapace depressed. 3rd–5th legs stout. Associated with corals . . . *Harpilius.*
  B. Dactyls of 3rd–5th legs simple or biunguiculate and with basal protuberance (fig. 151, *l*, *m*, *o*).
    a. Rostrum compressed, dentate. Dactyls of 3rd–5th legs with single claw, protuberance hoof-shaped (fig. 151, *l*, *m*). In corals . . *Coralliocaris.*
    b. Rostrum depressed, non-dentate. Dactyls of 3rd–5th legs biunguiculate, with flat basal protuberance (fig. 151, *o*). In bivalve Mollusca (*Tridacna* and *Meleagrina*) . . *Conchodytes.*

Gen. Palaemon Fabr.

River Prawns.

1898. Hilgendorf, Deutsch Ostafrika. Decap. Crust., p. 25 (key to East African species).

1900. Coutière, *l. c.*, p. 249.

1904. de Man, Trans. Linn. Soc. Lond., 2nd ser. zool., ix, pp. 299–324 (West African species).

1908. Stebbing, Ann. S. Afr. Mus., vi, p. 39 (*Macroterocheir*).

1910. *Id., l. c.*, pp. 384, 385 (*Palaemon, Eupalaemon, Parapalaemon, Macroterocheir*).

1910. Henderson and Matthai, Rec. Ind. Mus., v, p. 277 (Indian species).

1912. de Man, Rev. Zool. Afric., i, p. 413 (Congo species).

1915. Kemp, Mem. Ind. Mus., v, p. 265 (Chilka Lake species, and habits).

1926. Schmitt, Bull. Amer. Mus. Nat. Hist., liii, p. 27 (*Macrobrachium*, Congo species).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 5 (Japanese species).

Carapace with antennal and hepatic spines, but no branchiostegal (pterygostomial) spine. Ant. 1 with 3 flagella, the outer flagellum being cleft almost to base. Mandible with 3-jointed palp (1 exception). Mxp. 3 with pleurobranch. Dactyls of 3rd–5th legs simple. Telson with 4 apical spines. Appendix interna on pleopods 2–5, also appendix masculina on pleopod 2. Gills 6 plus 2 epipods.

Remarks.—The species of this genus are found in rivers and estuaries. They seem to be subject to considerable variation, and the separation of the species is often a puzzling and difficult matter.

P. lepidactylus is a distinct and easily recognizable species; but I am not at all sure that the specimens of the other species which I have seen are correctly identified. I have given descriptions of them, and indicated the points in which they seem to differ from other descriptions of the species to which they have been assigned.

Far more intensive collecting is necessary before the taxonomy of the South African species can be satisfactorily elucidated. Nothing is known about the life-history or the growth-changes. At present one can only describe *specimens*, not species.

Key to the South African Species.

I. 2nd legs robust (fig. 148, *b*, *c*), unequal in ♂, slightly so in ♀, 5th joint shorter than 4th. A ventral tooth between bases of uropods in both sexes. Hand, finger, and thumb of both 2nd chelae with scale-like granules, distinctly imbricate in ♂ (fig. 148, *d*), less so in ♀. 3rd–5th legs stout . . . . . *lepidactylus.*

II. 2nd legs slender (fig. 148, *h*), similar or unequal in ♀, 5th joint as long as or longer than 4th. No ventral tooth between bases of uropods.* 3rd–5th legs slender.

A. Carapace smooth.

1. ♂ finger and thumb of 2nd leg subequal to palm (fig. 148, *h*) . . . . . "*sundaicus.*"

2. ♂ finger and thumb of 2nd leg much shorter than palm . . . . . *delagoae.*

B. Carapace granulate or minutely spinulose, at least anteriorly (fig. 148, *i*).

1. One of the 2nd legs larger than the other in ♂, 5th joint short, scarcely longer than 4th.

a. ♂ finger of 2nd leg longer than palm, only the palm with felty pubescence . . *dolichodactylus.*

b. ♂ finger of 2nd leg shorter than palm, whole leg except finger and thumb with felty pubescence (*cf.* fig. 148, *h*) . . . *petersii.*

2. 2nd legs subequal in ♂, 5th joint long, longer than 4th.

a. Rostrum shorter than antennal scale. Finger and thumb of 2nd leg ♂ without denticles on inner edge (except 1 or 2 near base) . . . . . "*idae.*"

b. Rostrum as long as antennal scale. Finger and thumb of 2nd leg ♂ with a double row of denticles along inner edge . *rudis.*

Palaemon (*Macroterocheir*) *lepidactylus* Hilg.

Scaly-armed River Prawn.

Fig. 148, *a–d.*

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 838, pl. 4, figs. 14–16.
1880. Miers, Ann. Mag. Nat. Hist. (5), v, p. 384 (*sed loc.* ?).
1898. Hilgendorf, *l. c.*, p. 32, fig. B (*P.* (*Macrobrachium*) *l.*).
1900. Coutière, *l. c.*, p. 272, pl. 10, pl. 11, figs. 13, 13, *a.*
1908. Stebbing, *l. c.*, p. 40 (*Macroterocheir l.*).
1910. *Id.*, *l. c.*, p. 386 (*Macroterocheir l.*).
1913. Calman, Proc. Zool. Soc. Lond., p. 926.

Carapace smooth. Rostrum in ♂ $2\frac{1}{2}$–$2\frac{3}{4}$ times, in ♀ 2–$2\frac{1}{4}$ times in post-orbital length of carapace, depth (incl. teeth) less than ($\frac{1}{2}$–$\frac{2}{3}$) the width of basal joint of ant. 1; with 10–13, usually 11–12, teeth (excl. tip of rostrum) above, of which 4–5 are post-orbital, and 1–3, usually 2, below. 2nd legs stout, subequal in ♀, but very robust and unequal in ♂

* Present, however, in the East African *P. lar.*

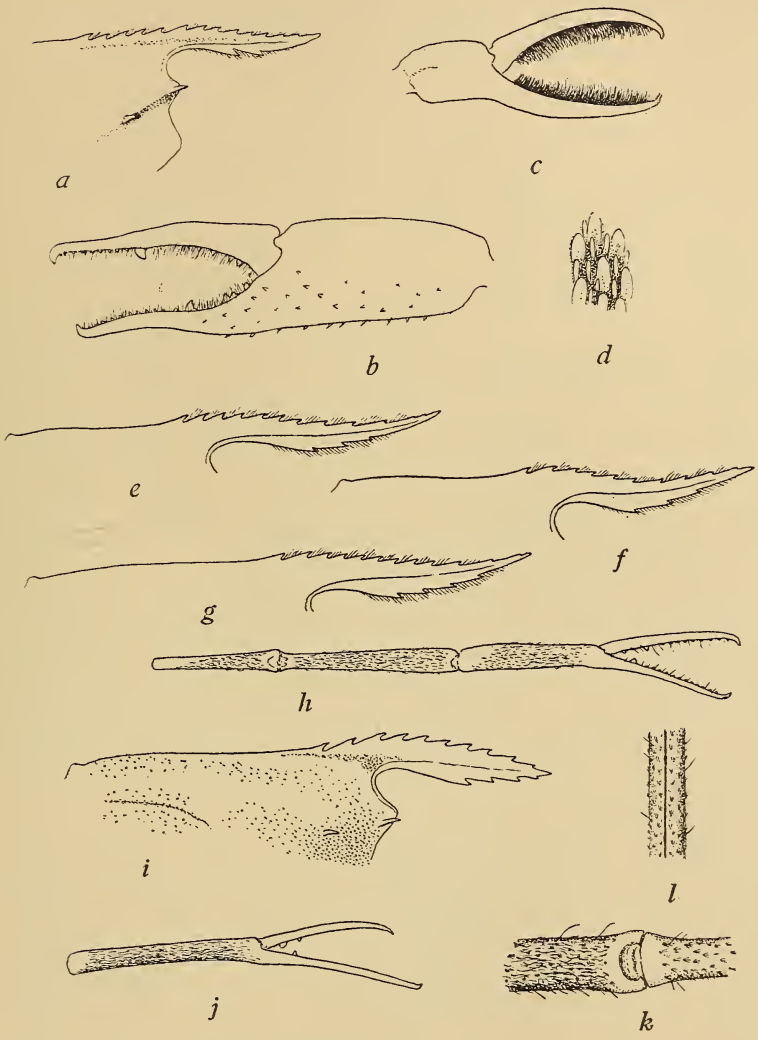


Fig. 148.—*Palaemon lepidactylus* Hilg. *a*, front of carapace and rostrum. *b*, chela of larger 2nd leg ♂, only the larger tubercles drawn in. *c*, chela of smaller 2nd leg ♂. *d*, detail of imbricate scale-like granules.
Palaemon "sundaicus." *e*, *f*, *g*, rostrum of a juv. 60 mm. total length, of a ♀ 88 mm., and of a ♂ 112 mm. respectively. *h*, 2nd leg of ♂.
Palaemon "idae." ♂, Isipingo. *i*, rostrum and part of carapace. *j*, chela of right 2nd leg. *k*, outer surface of junction of 6th joint and finger of same. *l*, inner edge of thumb of same.

(either the right or the left the larger), 5th joint shorter than 4th; the larger one in ♂ tuberculate and granulate, the granules on the upper and outer surfaces of wrist and hand, and on finger and thumb, becoming flattened scale-like and imbricate; finger and thumb a little longer than palm, sparingly setose on their opposed margins; thumb with 1–4 blunt teeth on inner margin proximally, a strong tooth slightly before the middle, and a double row of 12–14 (sometimes as many as 24) tubercular teeth distally, mostly in pairs but often irregular; finger similar, the big tooth slightly beyond middle, a double row of 6–12 (or more) tubercles distally; smaller cheliped in ♂ similarly granulate, finger and thumb nearly twice as long as hand, more or less gaping, opposed margins without teeth but usually densely setose. In ♀ 2nd legs nearly alike, with granulation similar to that of ♂ but the scale-like granules not so close as to be imbricate, finger and thumb in both legs subequal to palm, not gaping, sparsely setose, opposing margins cultrate, entire. 3rd–5th legs stout, 6th joint of 5th leg equal to the distance between the *antennal* spines on carapace. Telson with medio-dorsal tuft of setae near base. A laterally compressed tooth ventrally between bases of uropods.

Length ♂ up to 140 mm., ♀ 87 mm.; larger chela ♂ 190 mm. (a specimen in South African Museum 117 mm. in length has the larger cheliped from base of 3rd joint to tip of finger 130 mm.), ♀ (from base of 3rd joint) 50 mm. Male from Umgeni Lagoon (preserved a short while in formalin) buff with dark blue-green markings on carapace, a diffuse band of same colour along side of abdomen continued on to telson, similarly coloured but more diffuse markings medio-dorsally on anterior abdominal segments, eyes ultramarine.

Localities.—Quilemane and Tete, Portuguese East Africa (Hilgendorf); Umgeni River, Durban (Stebbing, and S. Afr. Mus.); Amatikulu River, 20 miles inland, Zululand (Natal Mus.); Barberton, Transvaal (Stebbing); Levubu River, a tributary of the Limpopo River (coll. C. J. van der Horst); Olifants River, Transvaal (S. Afr. Mus.); Nahoon River, East London, and Kei River (East London Mus.).

Distribution.—Tanganyika Territory. The closely allied, if not identical (see Calman, *l. c.*, 1913), *hilgendorfi* Cout. inhabits Madagascar; and the Malaysian *lepidactyloides* de Man is regarded by Roux (1923, Cap. Zool., II, 2, p. 11) as a variety.

Remarks.—Two ovigerous ♀♀ from Umgeni River were taken in March.

Palaemon (*Eupalaemon*), cf. *sundaicus* Heller

Smooth River Prawn.

Fig. 148, *e–h.*

1897. Weber and de Meijere, Zool. Jahrb., x, p. 165.
1898. Hilgendorf, *l. c.*, p. 30.
1900. Coutière, *l. c.*, pp. 250, 251, 273, pl. 14, figs. 44–46, *a.*
1910. Stebbing, *l. c.*, p. 384.
1915. *Id.*, *l. c.*, p. 73.
1918. Kemp, Mem. Asiat. Soc. Bengal, vi, p. 261.
1923. Roux, Cap. Zool., II, 2, p. 6.
1923. Stebbing, Fish. Mar. Biol. Surv., Rep. iii (1922), Spec. Rep. 3, p. 8, pl. 14 (*Urocaridella borradailei*).
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121 (*sundaicus*).
1940. Kubo, *l. c.*, p. 20, fig. 11.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 390.

Carapace smooth, feebly pitted on branchial region, less so in juv. and ♀ than in ♂. Rostrum in ♂ $1\frac{1}{3}$ times, in ♀ $1\frac{1}{8}$–$1\frac{1}{10}$ in post-orbital length of carapace, in juv. equal to or slightly longer than carapace, extending beyond end of peduncle of ant. 1, in ♂ to end of antennal scale, in juv. and ♀ slightly beyond, apex slightly up-turned, depth (incl. teeth) subequal to width of basal joint of ant. 1; with 10–13, usually 11–12, teeth above, of which 2 are post-orbital, 3–4 below. 3rd joint of 1st legs setose. 2nd legs slender, subequal in both sexes, 5th joint longer than 4th; in ♂ longer than body, all joints smooth (non-granulate), but covered with a short felt-like pubescence, finger and thumb subequal to palm, not gaping, thumb with 1 tooth, finger with 2 teeth near base, rest of opposing margins with a row of tubercles on either side of a median keel or cutting-edge; in ♀ shorter than body, similar to ♂ but glabrous or with very feeble development of the felt on the palm, finger and thumb with a minute denticle near base, cutting-edges relatively more prominent and not flanked by rows of tubercles. 3rd–5th legs slender, 6th joint of 5th leg equal to distance between the *hepatic* spines on carapace. Telson as in *lepidactylus*. No ventral tooth between bases of uropods.

Length ♂ up to 112 mm., ♀ 105 mm.; 2nd leg ♂ 130 mm., ♀ 77 mm. Smallest ovigerous ♀ 67 mm. Semi-transparent, slightly pinkish (as preserved in formalin), speckled with pinky-brown dots, a series of darker spots in middle of side of abdomen (one on hind margin of each segment), 2nd legs brownish, eyes black.

Localities.—Durban ("in See," probably = harbour or upper end of Bay) and Umgeni River (Weber and de Meijere); Umlaas River (Stebbing); Umhlotuzi River (Stebbing, as *Urocaridella*); Durban harbour, Umkomaas River, and mouth of Mtunzini River, Zululand (S. Afr. Mus.); Delagoa Bay (Barnard); Port St. Johns (S. Afr. Mus.); Buffalo River, East London (E. Lond. Mus.).

Remarks.—Ovigerous ♀♀ were taken from January to March.

Apparently Coutière himself saw no specimens from Natal. I have not seen his paper, and cannot compare the present specimens with his description of *sundaicus*. One of the ♂♂ was reported on by Stebbing, and there is also in the Museum a ♀ identified by him as *sundaicus*.

Hilgendorf (1898) and de Man (1904, p. 306) say the 2nd legs are not covered with woolly pubescence.

Hilgendorf says that *sundaicus* adult ♂ is distinguished from *mossambicus* by the smooth carapace, no felt on 2nd leg or 3rd joint of 1st leg, shorter chelae without rows of tubercles. Except that the carapace is not rough (even antero-laterally) these specimens therefore resemble *mossambicus*.

Henderson and Matthai (*l. c.*) agree with von Martens that *sundaicus* and *idae* are synonymous, but in Hilgendorf's key (1898) *idae* has finger and thumb *shorter* than palm, and a shorter rostrum.

The Delagoa Bay specimen (Barnard, 1926) is no longer available to me for checking the identification.

From Stebbing's description and figures it is perfectly clear that his "Urocaridella" was a *Palaemon*, and from the shape of the rostrum it should probably be identified with the present species. The fluviatile habitat ought to have given Stebbing a hint as to its identity.

Palaemon (*Eupalaemon*) *delagoae* Stebb.

1915. Stebbing, Ann. S. Afr. Mus., xv, p. 74, pl. 16 (Crust., pl. 80).

♂. Carapace apparently smooth, but with scattered microscopic spinules antero-laterally, and obscurely pitted on branchial region. Rostrum extending beyond antennal scale, slightly up-turned (apical point broken), depth (incl. teeth) slightly less than width of basal joint of ant. 1; with 9 teeth above, of which 3 (Stebbing said 2, but the 4th last is directly above hind margin of orbit) are post-orbital, 5 below. 2nd legs slender but decidedly unequal (right 106 mm. from base of 3rd joint, left 88 mm.), 4th joint $1\frac{3}{4}$ times (larger leg) or $1\frac{1}{2}$ times (smaller leg) in length of 5th joint, palm shorter than 5th joint, finger

and thumb in smaller leg equal, $1\frac{1}{3}$ times in palm, in larger leg thumb $1\frac{3}{4}$ in palm, finger shorter; both legs with rows of little granules and tubercles arranged more or less longitudinally, as far as end of palm, a few on outer surface of base of finger and thumb; finger and thumb covered with fur both on inner and outer surfaces, thumb with 2–3 small teeth followed by a larger one at base, finger with 2 moderate teeth at base (all teeth less conspicuous in smaller leg), rest of inner margin without denticles, but a feeble median cutting-edge. 3rd–5th legs slender, 6th joint of 5th leg greater than distance between hepatic spines on carapace. Abdomen dorsally feebly pitted, and also pleurae of segments 1–3, pleurae of segments 4 and 5, and lateral parts of segment 6, telson, and exposed parts of uropods minutely but distinctly granulate. Telson with median tuft of setae near base. No ventral tooth between bases of uropods.

Length ♂ 75 mm. (measured straight.)

Locality.—Delagoa Bay (Stebbing).

Palaemon (*Eupalaemon*), cf. *idae* Hell. var. *idella* Hilg.

Rough-shelled River Prawn.

Fig. 148, *i–l.*

1898. Hilgendorf, *l. c.*, p. 28 (*idae*) and p. 29, fig. A (var. *idella*).

Carapace closely granulate over nearly whole surface, more so in ♂ than in ♀, hinder part of branchial region pitted in both sexes. Rostrum extending to end of peduncle of ant. 1, but shorter than antennal scale, nearly symmetrically lanceolate, dorsal margin evenly convex, apex not curving upwards, about $1\frac{3}{4}$ in post-orbital length of carapace; with 10–12 teeth above, of which 2–3 are post-orbital, 3–4 below. 2nd legs ♂ elongate, slender, not very unequal, 5th joint longer than 4th, longer than palm, finger and thumb shorter than palm (in the Isipingo ♂ the finger is shorter than thumb), 3rd–6th joints (excl. thumb) covered with felty pubescence, when denuded without granules (but the numerous little pits from which the setae and pubescence arise appear like granules on a cursory glance), finger and thumb covered all over with tufts of short setules, with a few longer setae (fig. 148, *k*), finger with 2 denticles, thumb with 1, near base, no other denticles, no proper cutting-edge but proximally a narrow groove which passes over gradually into a slight indication of a cutting-edge distally. In ♀, 2nd leg shorter than body, 4th, 5th, and palm of 6th joint increasing slightly in length, finger and thumb subequal to 4th joint, each with

a single row of denticles and 2–3 larger ones basally, glabrous except for a few setae, rest of leg with felty pubescence. 3rd–5th legs slender, 6th joint of 5th leg in ♂ (missing in ♀) equal to (smaller specimen) or greater than (larger specimen) distance between hepatic spines. Abdomen obscurely pitted dorsally, in ♂ granulate on all pleurae, telson and exposed parts of uropods, feebly so in ♀. No ventral tooth between bases of uropods.

Length ♂ 105 mm., larger cheliped (base of 3rd joint to end of thumb) 170 mm.; ovig. ♀ 54, cheliped 32 mm.

Localities.—Isipingo River, and Umgeni River, Natal (S. Afr. Mus.).

Distribution.—*idae*: Mauritius, Seychelles, Zanzibar, East Indies.
idella: Tanganyika Territory.

Remarks.—The large ♂ is from Isipingo, the smaller ♂ (69 mm., both 2nd legs lost) and ovig. ♀ from Umgeni River.

The large cheliped is described by Hilgendorf, and also Henderson and Matthai, as rough, with felty pubescence confined to the finger and thumb, which are considerably shorter in *idae* and *idella* than in the present ♂ specimen.

The variety *idella* has large eggs.

Palaemon (*Eupalaemon*) *rudis* Heller

Furry-armed River Prawn.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 839, pl. 4, fig. 17 (*mossambicus*).

1898. *Id.*, *l. c.*, pp. 27 (in key), 29 (*mossambicus*).

1908. Stebbing, *l. c.*, p. 41.

1910. *Id.*, *l. c.*, p. 385.

1910. Henderson and Matthai, *l. c.*, p. 291, pl. 17, fig. 5, *a–h*.

1915. Kemp, *l. c.*, p. 268.

Carapace granulate antero-laterally, smooth on hinder part dorsally, pitted on branchial region. Rostrum extending to end of antennal scale, $1\frac{1}{3}$ in post-orbital length of carapace, similar to that of "*sundaicus*," *i.e.* dorsal profile slightly concave apically, with 11 teeth above, of which 2 are post-orbital, and 3 below. 2nd leg slender, wholly covered with felty pubescence, including thumb (finger missing), 5th joint longer than 4th and than palm, latter a little longer than 4th joint, thumb scarcely as long as palm, 1 tooth and 2 denticles at base, followed by a double row of denticles, cutting-edge

obscure and concealed in pubescence. Abdomen, telson, and exposed parts of uropods pitted.

Length of carapace 48 mm., of cheliped (from base of 3rd joint) 152 mm.

Locality.—Quelimane and Mozambique (Hilgendorf); Durban (Stebbing, and S. Afr. Mus.).

Distribution.—*rudis*: Ceylon, India, Madagascar.

mossambicus: Tanganyika Territory.

Remarks.—The South African Museum has only pieces of a ♂ specimen (formerly in the exhibited collection), which appears to belong to this species. The chelipeds have been painted blue (*cf.* Kemp).

Hilgendorf said the felt covers whole of cheliped except finger and 4th joint, and that under the felt there is a fine granulation.

Palaemon (*Parapalaemon*) *dolichodactylus* Hilg.

Strong-arm River Prawn.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 840, pl. 4, fig. 18.
1898. *Id.*, *l. c.*, pp. 27 (in key), 31.
1910. Stebbing, *l. c.*, p. 385.
1910. Henderson and Matthai, *l. c.*, p. 300, pl. 18, fig. 8, *a*, *b*.
1913. Calman, Proc. Zool. Soc. Lond., p. 926.

Carapace ♂ granulate anteriorly, pitted posteriorly. Rostrum extending to or nearly to end of antennal scale, apex scarcely upturned, 13–15 teeth above, of which 3–5 are post-orbital, 2–4 below. 2nd legs ♂ decidedly unequal, 5th joint short, scarcely longer than 4th in the larger, slightly longer in the smaller leg, palm a little longer than 4th joint, finger and thumb in larger leg much longer (1½ times) than palm, in smaller leg shorter than palm, larger leg with fine granulation and sparsely setose, palm and bases of finger and thumb with long felty pubescence, finger and thumb each with a single row of denticles decreasing in size distally, one or two near base larger than the others. No ventral tooth between bases of uropods.

Length ♂ 93 mm.

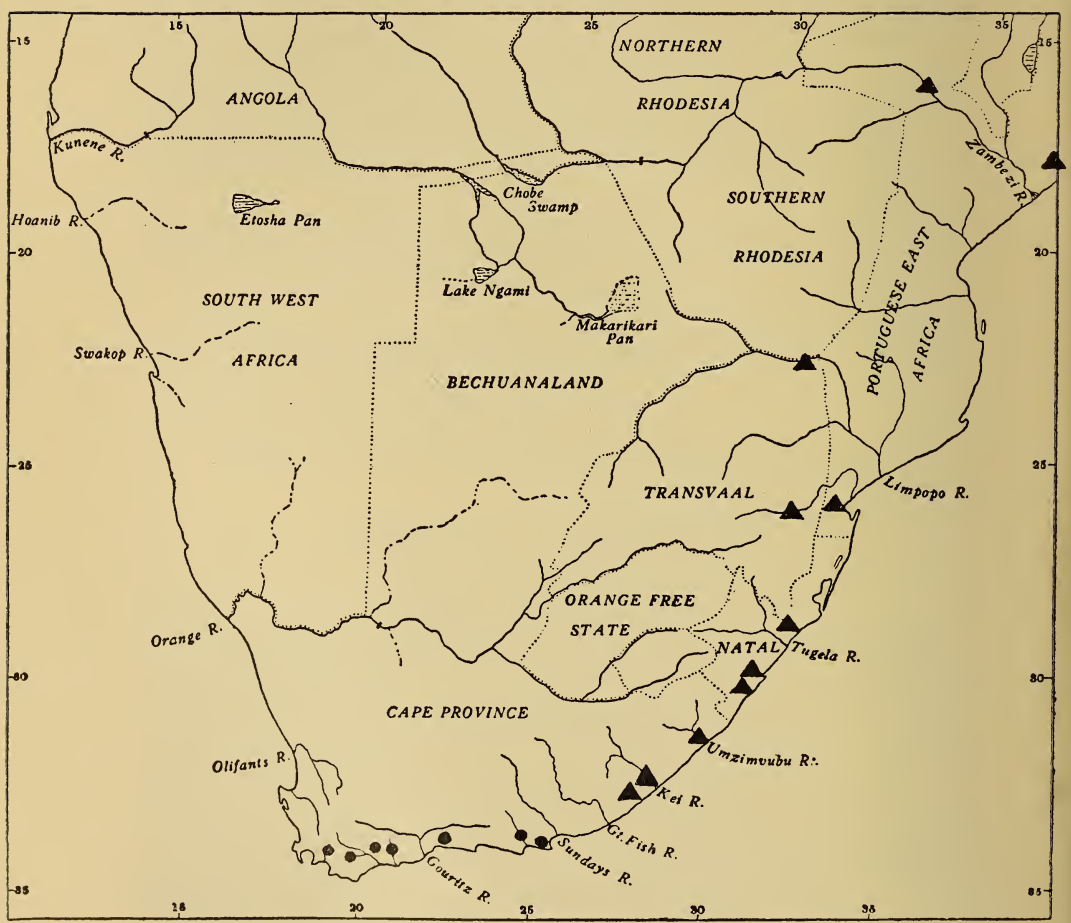
Localities.—Zambesi River at Tete, and Quelimane (Hilgendorf).

Distribution.—Tanganyika Territory; India; Madagascar.

Remarks.—Henderson and Matthai found this species and *scabriculus* living together, and incline to the view that they are different ♂ forms of one species.

Palaemon (*Parapalaemon*) *petersii* Hilg.

1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 841, pl. 4, fig. 19.
1897. Weber and de Meijere, Zool. Jahrb., x, p. 166.
1910. Stebbing, *l. c.*, p. 385.
1910. Henderson and Matthai, *l. c.*, p. 300 (note).



Recorded localities of the species of *Palaemon*, ▲, and of *Leander capensis*, ●.

Similar to *dolichodactylus*, but rostrum not extending beyond apex of peduncle of ant. 1, larger 2nd leg completely covered with felty pubescence except finger and thumb, which are polished, with scattered pits, and shorter ($\frac{3}{4}$) than palm. Rostrum with 12 teeth above, 3 below.

Length ♂ 50 mm. (Hilgendorf), 82 mm. (Weber and de Meijere), ovig. ♀ 55 mm. (Weber and de Meijere).

Localities.—Zambesi River at Tete (Hilgendorf); Umhloti River at Verulam, Umgeni River at Durban, and Illovo River, Natal (Weber and de Meijere).

Remarks.—Among 18 large ♂♂ from the Umhloti River, Weber and de Meijere found one in which the larger leg corresponded with that of *dolichodactylus* (finger and thumb longer than palm), but which in other respects (rostrum, finger and thumb without felt) resembled *petersii*. As these two forms were originally found in the same locality, possibly *petersii* will eventually have to be regarded as a synonym or variety of *dolichodactylus*. Henderson and Matthai suggested that *petersii* was a connecting link between *dolichodactylus* and *scabriculus*.

Gen. Leander Desm.

1900. Coutière, Ann. Sci. Nat., ser. 8, xii, p. 336 (wrongly dated in Stebbing).

1910. Doflein, Festschr. R. Hertwig, iii, pp. 1–76, pls. 1–4 (habits, coloration, reactions).

1910. Stebbing, *l. c.*, p. 386.

1914. *Id.*, Trans. Roy. Soc. Edin., 50, p. 286.

1917. Kemp, Rec. Ind. Mus., xiii, pp. 203 *sqq.*

1925. *Id.*, *ibid.*, xxvii, pp. 287 *sqq.* (synopsis of species).

1924. Gurney, "Terra Nova" Exp. Rep., zool., viii, p. 121 (larval stages).

1938. *Id.*, *l. c.*, p. 3 (larval stages).

1939. *Id.*, Ann. Mag. Nat. Hist. (xi), 3, p. 120, figs. (late larval stage).

1942. Kubo, J. Imp. Fish. Inst., xxxv, pp. 17 *sqq.*

Carapace with antennal and branchiostegal (pterygostomial) spines, but no hepatic spine (in 2 Indian species branchiostegal spine absent, and rostrum with elevated basal crest). Antenna 1 with 3 flagella. Mandibular palp 3-jointed (three exceptions, the European *squilla* being one). Mxp. 3 with arthrobranch and pleurobranch. Dactyls of 3rd–5th legs simple. Telson with 4 apical spines. Gills 7 plus 2 epipods.

Remarks.—In contrast with *Palaemon*, the species of this genus are mainly marine and estuarine, though certain species ascend rivers and others are known only from fresh waters.

Key to the South African Species.

I. Wrist (5th joint) of 2nd leg longer than chela (hand with finger and thumb) . . . . . *maculatus.*

II. Wrist not longer than chela (in typical *squilla* a very little longer) (fig. 149, *c*, *o*).

A. Fused part of outer flagellum of ant. 1 at least half as long as free part.

1. Mandibular palp 2-jointed. Finger of 2nd leg scarcely more than half length of palm . *squilla.*

2. Mandibular palp 3-jointed. Finger much more than half length of palm . . . . *affinis.*

B. Fused part of outer flagellum of ant. 1 less than half length of free part (fig. 149, *b*, *p*).

1. Rostrum apically curving upwards (normally).

a. Wrist of 2nd leg slightly shorter than 4th joint, and not more than $\frac{2}{3}$ length of chela (fig. 149, *c*). Marine and estuarine *pacificus.*

b. Wrist subequal to 4th joint, and $\frac{2}{3}$–$\frac{3}{4}$ length of chela. Estuarine . . . . *pacificus* var.

2. Rostrum almost symmetrically lanceolate, scarcely, if at all, curving upwards. Wrist of 2nd leg subequal to 4th joint, and nearly as long as chela (fig. 149, *o*). Fused part of outer flagellum of ant. 1 very short ($\frac{1}{6}$ of free part) (fig. 149, *p*). Fluviatile . . . *capensis.*

Leander quoianus, a New Zealand species, was recorded by Krauss from Natal (as *Palaemon quoianus*; see Stebbing, 1910, *l. c.*, p. 384). My field experience of the Natal fauna is not extensive enough to permit a guess as to what species of shrimp Krauss actually collected, unless it be *L. pacificus* var. (see *infra*) or possibly a species of *Hippolyte*; but *Leander* does not seem to be common on the Natal coast.

L. concinnus Dana is recorded from Mozambique and Zanzibar by Hilgendorf (1878, MB. Ak. Wiss. Berlin, p. 842).

Leander maculatus Thallwitz

1891. Thallwitz, Abh. Zool. Mus. Dresden, iii, p. 19, fig. 4.

1916. Balss, Beitr. Kenntn. Meeresf. Westafr., ii, p. 26, figs. 7, 8 (*edwardsii*, non Heller).

1925. Kemp, *l. c.*, p. 290 (in key), and footnote.

1926. Schmitt, Bull. Amer. Mus. Nat. Hist., liii, p. 25, fig. 65 (*Palaemon m.*).

Rostrum with 7 teeth above, of which one is post-orbital, a long bare interval between the foremost tooth and the next, 3 teeth below.

Branchiostegal spine on margin of carapace. Mandibular palp 3-jointed. Outer flagellum of ant. 1 with the fused part much shorter than free part ($1\frac{1}{3}$ times in free part: Balss, fig.). 5th joint of 2nd leg $1\frac{1}{2}$ times as long as chela. 3rd leg distinctly shorter than 4th and 5th legs.

Locality.—Gt. Fish Bay, Angola (Balss).

Distribution.—West Africa, to Congo River mouth.

Remarks.—The above description is taken from Kemp's synopsis and Balss' and Schmitt's figures. Kemp is responsible for the synonymy. Distinguished by the length of the wrist of 2nd leg.

Leander squilla (Linn.)

1910. Kemp, Fish. Irel. Sci. Invest. [1908], p. 132, pl. 20, fig. 3, *a–e.*

1913. Balss, Schultze Reise., v, p. 107.

1916. *Id.*, *l. c.*, p. 24.

1925. Kemp, *l. c.*, p. 292 (in key), and footnote 7 on p. 291.

1926. Schmitt, Bull. Amer. Mus. Nat. Hist., liii, p. 24, fig. 64 (*Palaemon s.*).

1943. Höglund, Sv. Hydrogr. Biol. Komm. Skr., n.s., ii, no. 6 (biology and larval development).

[Not *squilla* Stebbing, 1910. =*pacificus.*]

Rostrum with 6–10 teeth above, of which 2–3 are post-orbital, and 2–4 teeth below. Branchiostegal spine on margin of carapace. Mandibular palp 2-jointed. Outer flagellum of ant. 1 with fused part shorter than but at least half as long as free part. 5th joint of 2nd leg a little longer than 4th, subequal to chela, finger and thumb scarcely more than half length of palm.

Localities.—Swakopmund and Luderitzbucht, South West Africa (Balss).

Distribution.—Mediterranean and eastern Atlantic, from Norway to the French Congo and Angola.

Remarks.—Distinguished by the short finger and thumb of 2nd leg, and the 2-jointed mandibular palp.

Leander affinis M. Edw.

1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 287 (references).

? 1914. Lenz and Strunck, D. Südpol Exp., xv, p. 322 (*affinis* Bate).

1922. Verrill, Trans. Connect. Ac. Arts Sci., xxvi, p. 142, pl. 43, figs. 3–3, *b*, pl. 47, fig. 7.

1925. Kemp, *l. c.*, p. 282 (in key).

Rostrum with 8–9 teeth above, of which 2–3 are post-orbital, and 3–4 below, the apex bifid. Branchiostegal spine on margin of carapace. Outer flagellum of ant. 1 with fused part shorter than but at least half as long as free part. Mandibular palp 3-jointed. 5th joint of 2nd leg shorter than chela, finger and thumb much more than half length of palm.

Length up to 70 mm. (Stebbing).

Localities.—Saldanha Bay and Reitz Bay (Stebbing); Cape Town harbour (Lenz and Strunck).

Distribution.—West Indies; New Zealand.

Remarks.—Until the above two records are checked, this species must be included in the South African fauna-list. The s.s. *Pieter Faure* captured no examples of *Leander* in the Saldanha Bay area, nor are there any in the South African Museum. The above description is taken from Kemp's synoptic key.

Leander pacificus Stimpson

Sand-shrimp.

Fig. 149, *a–k.*

1906. Nobili, Ann. Sci. Nat. zool. (9), iv, p. 73.

1910. Stebbing, *l. c.*, p. 386 (*squilla*, non Linn.).

1915. *Id.*, Ann. S. Afr. Mus., xv, p. 75 (*affinis*, non M. Edw.).

1915. *Id.*, *ibid.*, p. 75, pl. 17 (Crust., pl. 81) (*peringueyi*, specimen with malformed rostrum).

1915. *Id.*, *ibid.*, p. 76, pl. 18 (Crust., pl. 82) (*gilchristi*, specimen with abnormal rostrum).

1917. *Id.*, *ibid.*, xvii, p. 34, pl. 4, fig. B (Crust., pl. 93, fig. B).

1925. Kemp, *l. c.*, pp. 293 (in key), 307 (references).

1938. Gurney, Gt. Barrier Reef Exp. Rep., vi, p. 3, figs. 1–7 (larva).

1942. Kubo, *l. c.*, p. 42, figs. (animal, appendages).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 390.

Rostrum curving slightly upwards apically, reaching to end of antennal scale (or slightly beyond in specimens with rostral formula $\frac{1}{5}^{0}$), 7–10 teeth above (usually 8–9), of which 2, sometimes 3, are post-orbital; 3–5, usually 4, below; the interval between the foremost dorsal tooth and the next one is usually longer than any of the other intervals; the tip may also be minutely bifid. Branchiostegal spine on margin of carapace. In adult the fused part of outer flagellum of ant. 1 is 3 to nearly 4 times in the length of the free part, but less in juv.

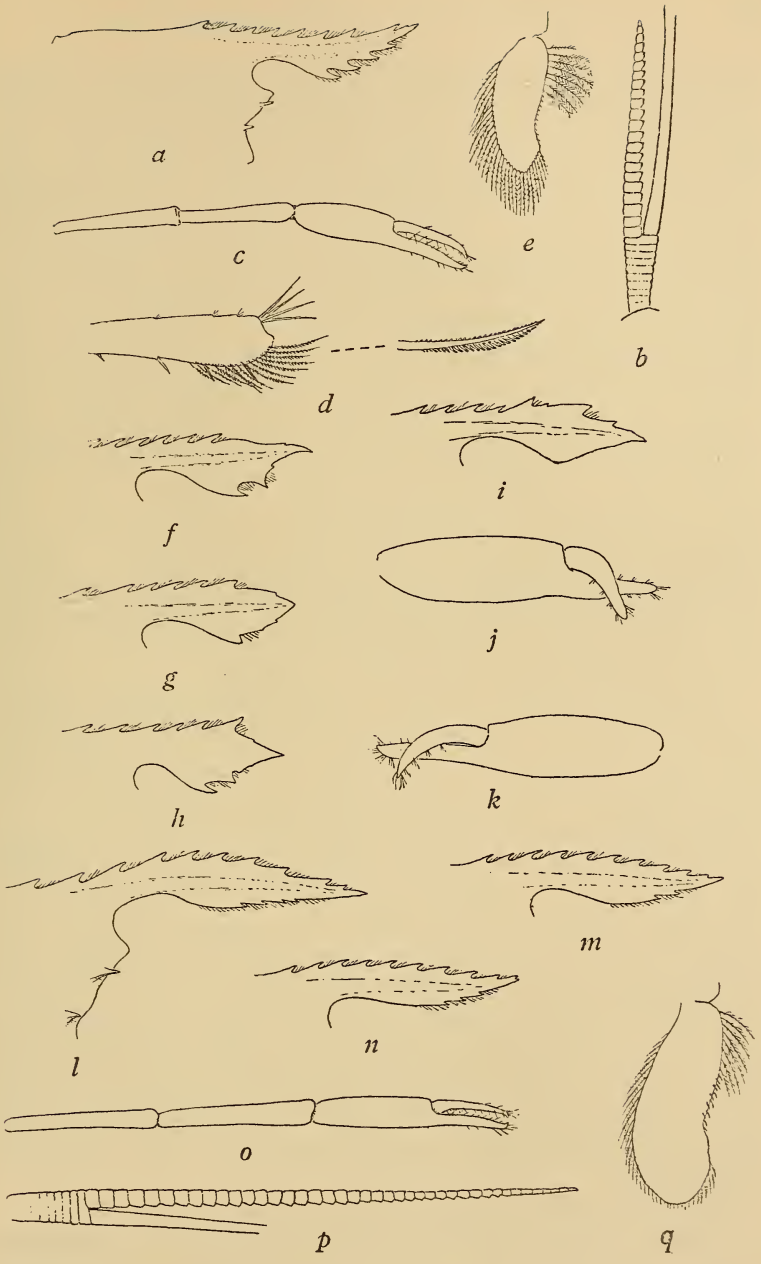


Fig. 149.—*Leander pacificus* Stimpson. *a*, front of carapace and rostrum. *b*, outer flagellum of antenna 1, setae omitted. *c*, 2nd leg. *d*, posterior surface of 6th joint of 5th leg. *e*, endopod of pleopod 1 ♂. *f*, *g*, *h*, *i*, three malformations of rostrum from St. James (False Bay) and one from Port Elizabeth. *j*, *k*, outer view of chela of (right and left respectively) 2nd legs of a ♂ from Cape Town docks. *Leander capensis* de Man. *l*, front of carapace and rostrum of specimen from Baakens River (Stebbing's "*serrifer*"). *m*, *n*, rostra of specimens from other localities. *o*, 2nd leg. *p*, outer flagellum of antenna 1, setae omitted. *q*, endopod of pleopod 1 ♂.

and immature (*e.g.* in specimens 18–25 mm. long, fused part only 1½ in free part), fused part with 7–8 segments and free part with 20–24 segments in adult (juv. 18 mm. has 3–4 and 7–8 segments resp., one 25 mm. has 5–6 and 12–13 segments resp.); outer margin of free part conspicuously serrate. Mandibular palp 3-jointed. 1st legs reaching slightly beyond apex of antennal scale, 5th joint a little longer (1¼ times) than 4th, 1½ (juv.)–2 (adult) times as long as chela, palm and finger subequal. 2nd legs, 4th joint slightly longer than 5th, the latter a little more than half length of chela, palm a little longer than finger. 6th joint of 5th leg with spaced spines on lower margin, the distal 2 (or 3) being on the anterior surface, postero-inferior surface distally with a series of doubly-serrate spines (often slightly more extensive than shown in fig. 149, *d*). No appendix interna on pleopod 1 ♂ (fig. 149, *e*); endopod about half length of exopod. Mxp. 3 with large arthrobranch and small pleurobranch. Between bases of 5th legs in ♂ a forwardly directed process, usually linguiform and flattened, sometimes with bifid apex, sometimes bluntly spiniform; a median sternal process on each of abdominal segments 1–3, flattened fore and aft and apically bifid on segments 1 and 2, conical on segment 3; in ♀ these sternal processes very obscure or obsolete.

Length ♂ up to 61 mm., ♀ 66 mm. Smallest ovig. ♀ 37 mm. Transparent, with streaks composed of greyish or pinkish dots, longitudinal and oblique on carapace and 6th abdominal segment, transverse on abdominal segments 1–5; eyes brownish grey; orange spots on legs, chiefly conspicuous at the junctions of 4th and 5th, 5th and 6th joints, and at bases of finger and thumb of 2nd leg, base of dactyls on 3rd–5th legs; orange dots on peduncles of pleopods, an orange spot on either side of 6th abdominal segment near base of telson, and one on outer margin of outer ramus of uropod; eggs grey (K. H. B., False Bay specimens) (*cf.* Doflein, *l. c.*, 1910, pl. 1, fig. 4).

Localities.—Muizenberg Vlei (*"squilla"*), Algoa Bay (*peringueyi*), East London (*gilchristi*),* and Mossel Bay (Stebbing); Table Bay, False Bay, St. Sebastian Bay, Mossel Bay, Ruigte Vlei near Knysna, Knysna Lagoon, Plettenberg Bay, Algoa Bay, Kasouga Lagoon, and East London, 0–25 fathoms, entering estuaries but rarely fresh water (S. Afr. Mus.).

Distribution.—Red Sea, Indo-Pacific to Japan.

Remarks.—Kemp has already stated (*l. c.*, p. 294) that *peringueyi* was founded on a specimen with malformed rostrum; and he did not include *gilchristi* in his synopsis. The latter "species" is likewise

* Stebbing's locality should read "East London, *collected by Mr. Wood.*"

founded on a specimen with unusual, if not malformed, rostrum. Amongst a hundred specimens from St. James (False Bay), 3 specimens were found with malformed rostra, which are here figured (fig. 149, *f–h*). In 85 specimens from Zwartkops River estuary, Port Elizabeth, there were three with malformed rostral tips, one of which is figured here (fig. 149, *i*).

Tabulation of the rostral formulae of the specimens at hand shows some remarkable results, although these must be checked on a very much larger number of specimens before they can be accepted as indicating definite facts. Only specimens with well-formed rostra were counted. The numbers of specimens with some extreme rostral formulae are added.

Thus, while 4 is the most frequent number of ventral teeth in all

L. pacificus.

Area.		Table Bay.	False Bay.	Mossel Bay.	Knysna.	Port Elizabeth.	East London.	Nahoon River.
Number of specimens examined		80	100	60	75	85	50	14
Percentages with:								
Dorsal teeth	7	5	6	8	8	10	10	14
	8	22	29	38	56	67	70	50
	9	60	57	49	32	23	20	29
	10	13	8	5	4	..	..	..
	11	..	..	..	..	..	..	7
Ventral teeth	2	..	..	..	1	2	..	7
	3	25	4	2	3	6	..	50
	4	58	76	75	71	80	78	43
	5	17	20	23	24	12	22	..
	6	..	..	..	1	..	..	..
Number of specimens with rostral formula:								
$\frac{7}{5}$		3	1	4	..	4	..	..
$\frac{8}{5}$		..	..	..	1	..	..	..
$\frac{9}{5}$		..	..	..	1	1	..	..
$\frac{9}{6}$		..	..	..	1	..	..	..
$\frac{10}{5}$		5	2	2	2	..	..	..
Number of specimens with malformed rostra:								
		..	3	..	..	3	..	..

areas, the preponderance of 9 dorsal teeth in the Table Bay area decreases and eventually gives place to 8 at Knysna, and the preponderance of 8 becomes successively greater farther eastwards. Similarly there is a decrease in the number of specimens with 10 dorsal teeth, and an increase in the number of those with only 7.

Stebbing at first identified the Muizenberg Vlei specimens as *squilla*, a species with a 2-jointed palp, afterwards as *affinis*. The proportions of the joints of the 2nd legs, and the outer flagellum of ant. 1, preclude the specimens from being either of these species. But curiously there is amongst the duplicates not sent to Stebbing one specimen in which the mandibular palp is 2-jointed (on both mandibles). Possibly one of the specimens sent to Stebbing had this peculiarity, thus leading to his original identification; but I have found no other specimen (except in "*serrifer*," *v. infra*).

Amongst the Table Bay specimens there is a 48 mm. ♀ in which both 2nd legs are regenerating from the 3rd joints onwards, their length from base of this joint being 6 mm. Also a 50 mm. ♂ in which the finger of the chela of left 2nd leg is falcate, crossing the thumb externally; in the right chela the finger also crosses the thumb, but both are malformed (fig. 149, *k*, *j*). Also a 48 mm. ♀ in which the fingers and thumbs of both chelae are more or less crossed. A juvenile from Plettenberg Bay has one of the pair (the other is missing) of 2nd legs with finger and thumb crossed.

The present specimens agree with Kemp's description except that the 5th joint (wrist) of 1st leg is a little *longer* than the 4th (merus) instead of shorter, and attains in the adult twice the length of the chela (Kemp gives 1·4–1·65 times).

This is the common Sand-shrimp of the rock-pools and estuaries around the coast. It occurs in the brackish parts of estuaries, but the only specimens which the South African Museum has from purely fresh water are juveniles from Ruigte Vlei near Knysna.

Ovigerous ♀♀ have been taken: in Table Bay in July and November, at St. James (False Bay) in January and February, in Mossel Bay in March and July, at Knysna in August and October, at Port Elizabeth in November, and at East London in April, July and December.

No parasites were found on any of the specimens.

Leander ? *pacificus* var.

Fourteen ovigerous and non-ovigerous ♀♀ from the Nahoon River, near East London (? from purely fresh part or from the estuary), show certain features of *pacificus* as detailed above.

The rostrum curves slightly upwards apically, with the following formulae (number of specimens of each in brackets): $\frac{7}{3}$ (1), $\frac{7}{4}$ (1), $\frac{8}{2}$ (1), $\frac{8}{3}$ (4), $\frac{8}{4}$ (2), $\frac{9}{3}$ (1), $\frac{9}{4}$ (3), $\frac{11}{3}$ (1). In the last-mentioned one, two of the teeth are small and obviously supernumerary. The percentages of the teeth are given in the above table for what they are worth. The branchiostegal spine is on the margin and projects beyond it.

The 2nd leg, however, differs from that of typical *pacificus*: the 5th joint (wrist) is a trifle longer than 4th joint, and nearly as long as the chela (= distance from base of palm to distal third of finger).

The fused part of outer flagellum of ant. 1 is relatively longer; it contains 8–10 joints, its length is not more than 1½ times in the free portion, which contains 11–18, usually 13–15, feebly serrate joints.

With so few specimens no decision as to the specific identity of this form is justifiable.

Four specimens from Isipingo Lagoon, Natal, seem to indicate that these specimens are merely variants of *pacificus*. The rostral formulae are $\frac{8}{3}$ (2), $\frac{8}{4}$ (1), and one with short rostrum and $\frac{4}{0}$ teeth, evidently due to injury. The outer flagellum of ant. 1 of the 2 smaller ♂♂ are like those of the Nahoon River specimens, but those of the 2 larger ♀♀ are like typical *pacificus*.

The 2nd leg has the wrist nearly as long as the chela, as in the Nahoon River specimens. Sternal processes as in *pacificus*.

Leander capensis de Man

Cape River Shrimp

Fig. 149, *l–q*.

1897. de Man in Weber, Zool. Jahrb., x, p. 174, pl. 15, fig. 3, *a–g*.
1910. Stebbing, *l. c.*, p. 386 (authorship wrongly credited to Weber).
1914. *Id.*, Ann. S. Afr. Mus., xv, p. 31 (*serrifer*, non Stimpson).
1925. Kemp, *l. c.*, p. 291 (in key).
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 391.

Rostrum straight, with gently and evenly convex dorsal and ventral profiles, sometimes with a slight upward trend apically, extending to end of antennal scale, 9–12 teeth above, usually 11, of which 2 are post-orbital, 1–4 below, usually 3 or 4, the lower teeth not prominently outstanding, often scarcely projecting beyond the general profile. Branchiostegal spine smaller than antennal spine, arising

within, and its point not projecting beyond, margin of carapace. Fused part of outer flagellum of ant. 1 relatively very short, with 5–7 joints, 6–7 times in length of free part which has 35–45 joints, and is serrate on outer margin. Palp of mandible 3-jointed. 1st legs reaching beyond antennal scale by a little more than length of chela, 5th joint $1\frac{1}{4}$ times as long as 4th, and twice as long as chela, finger and thumb subequal to palm (or a trifle shorter). 2nd legs, 5th joint subequal or a very little longer than 4th, and almost equal to chela; in some large specimens length of 5th joint may reach only to distal third of finger, in one case only half-way along finger; finger and thumb slightly shorter than ($1\frac{1}{4}$ times in) palm. 6th joint of 5th leg with serrate spines as in *pacificus*. No appendix interna on endopod of pleopod 1 ♂; endopod about $\frac{2}{3}$ length of exopod, *i.e.* relatively larger than in *pacificus*, similar in shape but with a shorter setae around distal margin. Mxp. 3 with large arthrobranch and small pleurobranch. No sternal process between bases of 5th legs, a small conical tubercle on hind margin of 1st and 2nd abdominal sternites in ♂.

Length ♂ up to 48 mm., ♀ 66 mm. Semi-transparent, with minute pinkish speckling over carapace and abdomen, 3–4 obliquely longitudinal stripes on carapace composed of pinkish-brown dots, the hinder margins of the abdominal segments and outer margins of rami of uropods darker pink, a small grey spot in middle of side on hind margin of abdominal segments 1, 2, and 4–6; 2nd legs pinkish, apex of 4th joint, whole of the wrist, and finger and thumb yellowish, apex of palm at base of finger grey (2 dark dots in this position remain visible for a long time in specimens in alcohol), eyes dark brown.

Localities.—Knysna River (de Man); Baakens River, Port Elizabeth (Stebbing: as *serrifer*); Palmiet River near Kleinmond (Cape) and River Zonder End near "Lindeshof" (Caledon Division), Buffelsjagt River near Swellendam, Duivenhoks River near Heidelberg (Cape), Gt. Brak River (Mossel Bay), Gamtoos River near Patentie (S. Afr. Mus.).

Remarks.—Well distinguished from the marine and estuarine *pacificus* by the nearly symmetrical lancet-shaped rostrum, with its almost regularly spaced teeth, the shortness of the fused part of outer flagellum of antenna 1, and the position of the branchiostegal spine.

In 65 specimens the frequency of the numbers of dorsal and ventral rostral teeth is as follows: dorsal 9, 10 per cent., 10, 26·5 per cent., 11, 53·5 per cent., and 12, 10 per cent.; ventral 1, 3·5 per cent., 2, 18·5 per cent., 3, 39 per cent., and 4, 39 per cent.

Stebbing's specimen from the Baakens River, identified by him as *serrifer*, is really *capensis* with an unusually strongly arched dorsal rostral profile (fig. 149, *l*). Its right mandible has a 2-jointed palp, the left is normal. I have not seen any more specimens from this locality, but a couple of specimens from the Duivenhoks River have similarly arched rostra.

The River Zonder End locality is some 60 miles above tidal limit of the Breede River (of which the River Zonder End is a tributary).

Ovigerous ♀♀ were taken in the Palmiet River in mid-November, and in the Gamtoos River at the end of October.

The Cape River Shrimp is almost certainly to be found in other southern Cape rivers. None were captured during fish-netting operations in the Zwartkops River near Uitenhage, and the Baakens River is up to the present the most easterly recorded locality. Nor have any been taken in the Berg River or the Olifants River (Clanwilliam), which I have extensively examined in the course of fish-netting operations. The tentative comparison may thus be made between the distribution of Freshwater Eels (*Anguilla*) and that of the River Shrimp.

The hydrogen-ion concentration in the recorded localities (no observation in the Baakens River) varies from pH 4·5 (Palmiet River) to 8·5 (Gamtoos River).

Gen. Palaemonetes Heller

1925. Kemp, *l. c.*, pp. 285 (in key), 314.

Distinguished from *Leander* by the absence of the mandibular palp. Mostly inhabitants of fresh and brackish water.

P. africanus Balss 1916 occurs in Nigeria. Kemp (*l. c.*, pp. 317, 327) considers that *P. natalensis* Stebb. 1915 is probably a species of *Periclimenes* (*v. infra*).

Subfamily Pontoniinae.

1917. Borradaile, Trans. Linn. Soc. Lond., 2nd ser., zool., xvii, pp. 323 *sqq.*

1922. Kemp, Rec. Ind. Mus., xxiv, pp. 113 *sqq.* (key to genera).

1924. Gurney, "Terra Nova" Rep., zool., viii, p. 127 (larval stages).

1935. Gordon, J. Linn. Soc. Lond., xxxix, pp. 339 *sqq.* (position of *Anchistioides*, key to species).

1938. Gurney, Gt. Barrier Reef Exp. Rep., vi, pp. 15 *sqq.* (larval stages).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 31 (Japanese species).

Gen. Anchistus Borrad.

1898. Borradaile, Ann. Mag. Nat. Hist. (7), ii, p. 387.

1917. *Id.*, *l. c.*, p. 387.

1922. Kemp, *l. c.*, pp. 120 (in key), 247.

1925. *Id.*, Rec. Ind. Mus., xxvii, p. 327.

Rostrum curved downwards, distally compressed, not dentate except sometimes at apex. Carapace smooth, antennal spine sometimes present. Eyes small. Outer flagellum of ant. 1 not deeply cleft. Antennal scale broad. Mandible without palp. Inner lobe of mx. 1 broad, setose. All three maxillipeds with exopods; the 2 distal joints of mxp. 3 always slender, not twisted. 2nd legs with robust chelae, often unequal. Dactyls of 3rd–5th legs curved, simple or biunguiculate, without basal process. Postero-lateral corner of abdominal segment 6 more or less rounded. Dorsal spinules on telson very small. Commensal in bivalve Mollusca (*Pinna*).

Anchistus inermis (Miers)

Fig. 150, *a–d*.

1884. Miers, Crust. H.M.S. *Alert*, p. 291, pl. 32, fig. B (*Harpilius i.*).

1894. Ortmann, Semon's Austral. Reise, v, p. 16, pl. 1, figs. 3, 3, *a*, 3, *n* (*Pontonia pinnae*).

1921. Tattersall, J. Linn. Soc. Lond., xxxiv, p. 391, pl. 27, fig. 4.

1922. Kemp, *l. c.*, p. 249, fig. 81.

1925. *Id.*, *l. c.*, p. 322.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.

1927. Hale, Crust. S. Austral., pt. 1, p. 57, fig. 52.

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 48, figs. 15–17.

Rostrum apically rounded and toothless. Antennal spine sometimes represented by a minute process. Basal process of ant. 1 apically rounded, with a small subapical denticle on outer margin. Antennal scale with convex outer margin ending in a small spine not reaching the rounded apex of lamellar part. Antepenultimate joint of mxp. 3 much broader than the 2 distal joints. Chela of 1st leg with margins produced like flaps, setose, the hand in cross-section semicircular. 2nd legs unequal, the right or the left the larger, chela

robust. Dactyls of 3rd–5th legs strongly hooked, simple, basal width about half the distal width of 6th joint.

Length up to 25 mm. (Kemp: one ♀ 39 mm.). Pale translucent buff, yellowish or pink, the colour formed by numerous stellate specks

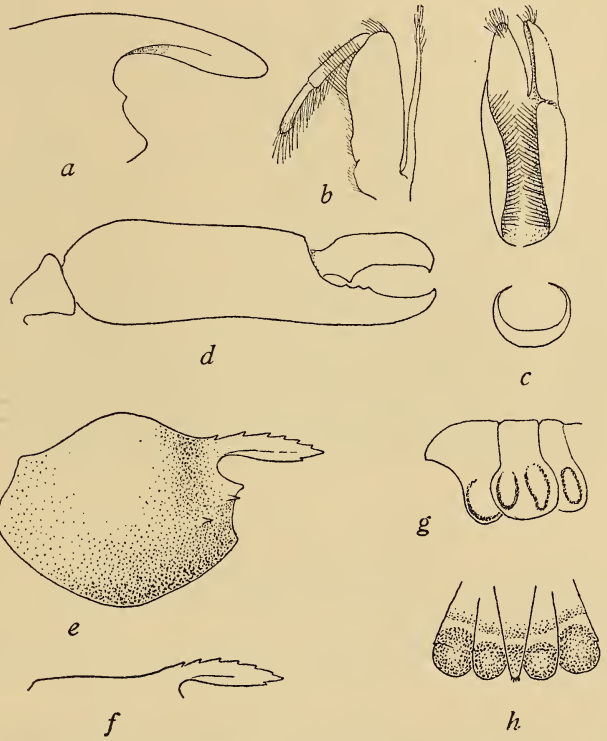


Fig. 150.—*Anchistus inermis* (Miers). *a*, rostrum. *b*, mxp. 3. *c*, chela of 1st leg, with cross-section through palm. *d*, 2nd leg, larger chela. *Periclimenes* (*Ancylocaris*) *brevicarpalis* (Schenkel). *e*, carapace of adult ♀. *f*, dorsal profile of carapace, and rostrum, ♂. *g*, pleurae of abdominal segments 1–3. *h*, apices of telson and uropods, to show colour pattern.

on a translucent (white) ground colour, eyes dark brown, chelae pinky-white, deepest apically. Kemp says the body and legs in ♀ are covered with minute white dots.

Locality.—Delagoa Bay (Barnard; and coll. C. J. van der Horst).

Distribution.—Dar-es-Salaam, Red Sea, Indian Seas, Australia, Polynesia, Japan.

Remarks.—The specimens taken by Professor van der Horst were found in *Pinna* shells. It is a matter for conjecture to what use the remarkable 1st chela may possibly be put.

Gen. Periclimenes Costa

1922. Kemp, *l. c.*, p. 134 (references, synonyms, discussion on subdivision).

1927. Gurney, Trans. Zool. Soc. Lond., pt. 2, p. 264 (larvae).

1938. *Id.*, Gt. Barrier Reef Exp. Rep., vi, p. 16 (larvae).

Rostrum dentate. Carapace not depressed, with antennal spine, supra-orbital and hepatic spines present or absent. Outer flagellum of ant. 1 not deeply cleft. Eyes well developed. Mandible without palp. Inner lobe of mx. 1 narrow. All three maxillipeds with exopods. 2nd legs with stout chelae. Dactyls of 3rd–5th legs simple or biunguiculate, without basal process.

Remarks.—As noted above (p. 791), Kemp (1925) considered that Stebbing's "*Palaemonetes*" *natalensis* (1915, Ann. S. Afr. Mus., xv, p. 78, pl. 19 (Crust., pl. 83)) was a species of *Periclimenes*. The depth at which it was caught (440 fathoms) is certainly against its being a *Palaemonetes*. The single specimen was defective (1st legs), Stebbing did not give the gill-formula, and no further specimens have come to hand. It must therefore be regarded as a *species dubia*.

Subgen. *Ancylocaris* Schenkel

1922. Kemp, *l. c.*, pp. 137, 167 (key to species).

1940. Kubo, *l. c.*, p. 41.

Dactyls of 3rd–5th legs simple. Hepatic spine usually present.

Perclimenes (*Ancylocaris*) *brevicarpalis* (Schenkel)

Fig. 150, *e–h*.

1893. Saville-Kent, Gt. Barrier Reef, pp. 33, 145, chromo pl. 2 ("*Palaemon*").

1902. Schenkel, Vern. naturf. Ges. Basel, xiii, p. 563, pl. 13, fig. 21, *a–m*.

1905. Lenz, Abh. Senckenb. Ges., xxvii, p. 380, pl. 47, figs. 14, 14, *a–c* (*Harpilius latirostris*).

1906. Nobili, Bull. Sci. Fr. Belg., xl, p. 52, pl. 4, figs. 9, 9, *a–b* (*A. aberrans*).

1914. Rathbun, Proc. Zool. Soc. Lond., p. 655, pl. 1, figs. 1–3 (*P. hermitensis*).

1917. Borradaile, *l. c.*, pp. 355, 356.

1922. Kemp, *l. c.*, p. 185, figs. 40–42, and pl. 6, fig. 8.
1940. Kubo, *l. c.*, p. 46, figs. 13, 14.
1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 391.

Carapace strongly swollen in adult ♀, in juv. and ♂ dorsal profile nearly straight; hepatic spine at a lower level than antennal spine, no supra-orbital spine. Rostrum not extending to end of antennal scale, lanceolate, 5–7, usually 6, teeth above, 0–2, usually 1, below. Lamellar part of antennal scale extending well beyond spine on outer margin. 1st leg extending beyond end of scale by the length of chela, 4th joint slightly longer than 5th, which is distinctly longer than chela, finger and thumb nearly or quite as long as palm, cutting-edges entire. 2nd legs subequal, in ♂ extending beyond end of scale by length of chela or chela plus wrist, shorter in juv. and ♀; no teeth on 3rd, 4th, or 5th joints, 5th joint less than half length of palm in ♂, nearly or quite equal to half in ♀, finger and thumb at least $\frac{2}{3}$ length of palm, cutting-edges with small denticles proximally in ♂, obscure or obsolete in ♀. Dactyls of 3rd–5th legs simple, broad at base, curved. 6th abdominal segment $1\frac{1}{2}$ times length of 5th; pleurae of abdominal segments 1–3 large in ovig. ♀. Telson with 2 pairs of minute spinules in distal half.

Length ♂ up to 23 mm., ♀ 39 mm. Coloration brilliant. Transparent (Kemp: with pure white patch on either side of carapace in ♀), hepatic and other internal organs dull reddish; on sides of each of abdominal segments 1–3 oval patches of white outlined with reddish brown (Kemp: black, violet, blue, or orange); Kemp seems to imply that there is only one patch on each segment, but in the present specimens there were (when fresh) *two* patches on the 2nd segment, *i.e.* 4 in all (Rathbun also says 4); at the ends of both rami of uropods and the telson there is a yellow or orange spot, bordered proximally with white, then yellow; in Kemp's description and Saville-Kent's picture the yellow spots are bordered with black, purple, or red-brown; legs with blue or violet rings at ends of the joints, especially of the 4th and 5th joints and palm of 2nd legs; a subapical band of same colour on the finger and thumb of 2nd leg. Young specimens may lack the lateral abdominal patches and the spots on the tail-fan.

Locality.—Delagoa Bay, associated with the Giant Anemone *Stoichactis* (coll. C. J. van der Horst).

Distribution.—Mauritius?, Zanzibar, Red Sea, Persian Gulf, Indian Seas, N. and N.E. Australia, Polynesia.

Remarks.—The association of this shrimp with the Giant Anemone (*Discosoma* or *Stoichactis*) has been described by Saville-Kent, Kemp,

Kubo, and others. Kemp (1916, Rec. Ind. Mus., xii, pp. 389–390) records the occurrence of a fish, *Amphiprion*, also with white patches or streaks, similar to that figured by Saville-Kent. Professor van der Horst also found an *Amphiprion* in association with the Anemone.

Kemp says that there is no sexual difference in the 2nd leg, and in the key and fig. 41, *b*, the wrist is less than half the length of palm. This applies for the ♂ and young ♀, but in the adult ♀ it is at least equal to half the palm.

Gen. Harpilius Dana

1852. Dana, U.S. Expl. Exp., Crust., p. 575.
1917. Borradaile, *l. c.*, pp. 379, 380 (*Harpiliopsis* and *Harpilius*).
1921. Tattersall, J. Linn. Soc. Lond., xxxiv, p. 388.
1922. Kemp, *l. c.*, pp. 120 (in key), 226 (key to species).
1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 1.

Differs from *Periclimenes* only in its more clumsy and depressed form. Distal spine of basal joint of ant. 1 usually very long; antepenultimate joint of mxp. 3 often broadened; 2nd legs heavily built, with 4th joint apically flattened or hollowed for reception of the wrist when folded; 3rd–5th legs stout, without spines on 6th joint, and with simple strongly hooked dactyls. This combination of characters produces a distinct facies, though each character separately may be paralleled in the species of *Periclimenes* (Kemp).

Differs from *Coralliocaris*, which is also found associated with corals, in the simple 3rd–5th dactyls without basal protuberances.

Key to the South African Species.

1. Hepatic spine on a lower level than antennal spine. Antepenultimate joint of mxp. 3 narrow (fig. 151, *c*) . . . . *depressus.*
2. Hepatic spine on same level as antennal spine. Antepenultimate joint of mxp. 3 broad (fig. 151, *g*) . . . . *beaupresi.*

Harpilius depressus Stimpson

Fig. 151, *a–e.*

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 38.
1906. Rathbun, Bull. U.S. Fish. Comm. for 1903, p. 920, fig. 68, and pl. 24, fig. 12.
1917. Borradaile, *l. c.*, p. 380, pl. 56, fig. 22, *e–i* (mx. 1, 2, mxp. 1–3) (*Harpiliopsis d.*).

1921. Tattersall, *l. c.*, p. 389, pl. 28, fig. 7 (3rd leg).

1922. Kemp, *l. c.*, p. 231, figs. 69, 70, and p. 234, fig. 71 (var. *gracilis*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 391.

Carapace strongly depressed, no supra-orbital spine, hepatic spine at a lower level than antennal spine; rostrum not extending to end of antennal scale, with 5–7 (usually 6 or 7) teeth above, none of them post-orbital, 2–5 (usually 3 or 4) below. Antepenultimate joint of mxp. 3 narrow (Kemp, *typ. err.*: broad), about 6 times as long as wide. 2nd leg, 3rd joint with apical spine on lower margin, 4th with apical spine on both upper and lower margins, 5th with apical spine on lower margin, outer margin of finger convex, no longitudinal keel on lower surface. 3rd–5th legs stout, 5th joint apically produced over base of 6th, dactyls stout, curved, hollowed below. Postero-inferior angles of 4th and 5th abdominal segments acutely pointed. Posterior pair of dorso-lateral spinules on telson nearer to the anterior pair than to apex.

Length ♀ up to 24 mm. Striped with deep blue on a pale grey ground-colour, a narrow mid-dorsal yellow stripe on 3rd abdominal segment, and a yellow stripe near lower margins of pleurae of 1st–3rd segments, uropods blotched with blue, with milk-white tips, chela of 2nd leg greenish, with yellow finger and thumb, basal joints and other legs spotted with blue, dactyls of 3rd–5th legs reddish. Eggs pale brown (Kemp).

Locality.—Delagoa Bay (Lourenzo Marques Mus., 1 ovig. ♀).

Distribution.—Red Sea, Seychelles, Madras, Andaman Is. (var. *gracilis*), Loyalty Is., Hawaiian Is.

Remarks.—The single specimen has lost both of the 2nd legs, but appears to be in agreement with the description of this species in other respects.

Harpilius beaupresi (Audouin)

Fig. 151, *f–h*.

1829. Audouin in Savigny, Descr. d'Egypte, p. 91, pl. 10, fig. 4 (*Palaemon b.*).

1917. Borradaile, *l. c.*, p. 379, pl. 55, fig. 21 (mxp. 3) (*Harpiliopsis b.*).

1921. Tattersall, *l. c.*, p. 389, pl. 28, fig. 8 (dactyl, 3rd leg).

1922. Kemp, *l. c.*, p. 229, figs. 67, 68 (carapace, 2nd leg).

1938. Gurney, *l. c.*, p. 18, figs. 67–74 (larva).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 391.

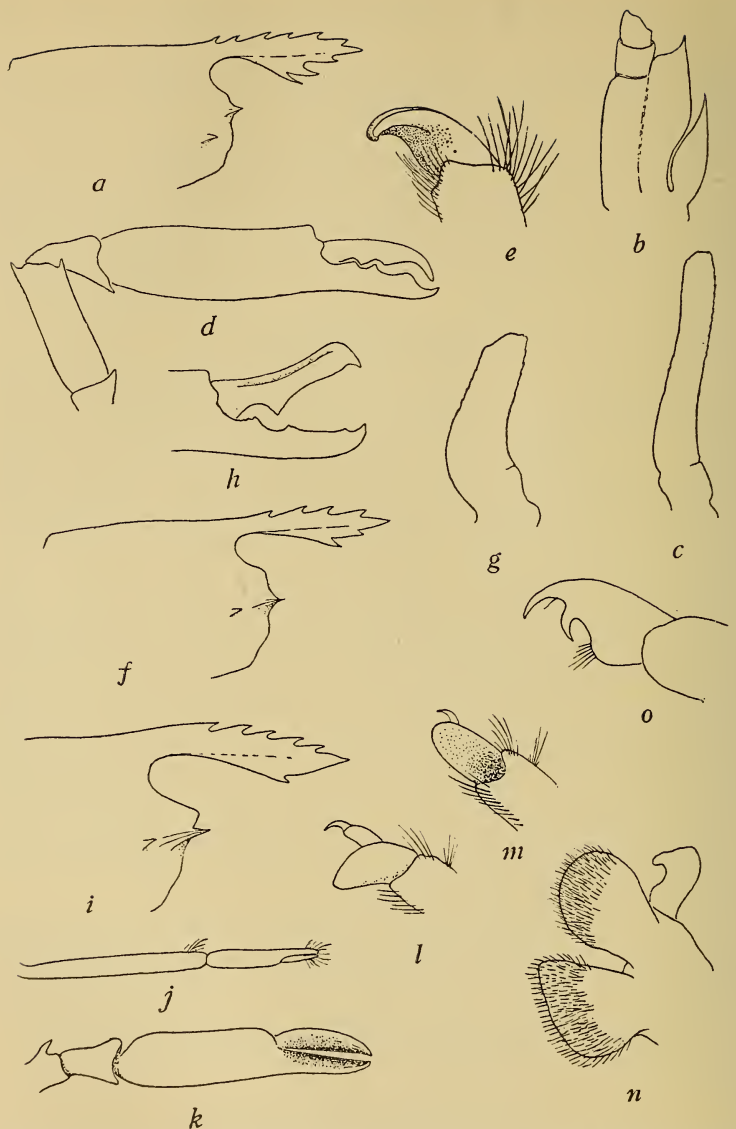


FIG. 151.—*Harpilius depressus* Stimpson. *a*, front of carapace and rostrum. *b*, peduncle of ant. 1. *c*, antepenultimate joint of mxp. 3. *d*, 2nd leg (after Kemp). *e*, inner view of dactyl of 3rd–5th legs.

Harpilius beaupresi (Audouin). *f*, front of carapace and rostrum. *g*, antepenultimate joint of mxp. 3. *h*, lower surface of finger and thumb of chela of 2nd leg (after Kemp).

Coralliocaris lucina Nob. *i*, front of carapace and rostrum. *j*, 1st leg. *k*, outer view of chela of smaller 2nd leg. *l*, *m*, lateral and ventral views of dactyl of 3rd–5th legs.

Conchodytes meleagrinae Peters. *n*, mx. 1. *o*, dactyl of posterior legs (both figures after Borradaile).

Differs from *depressus* as follows: rostrum shallower, with 4–7 (usually 4 or 5) teeth above, 2–4 (usually 2 or 3) below; the antennal spine remote from suborbital angle, supported by a keel extending to the hepatic spine, which is about on the same level; antepenultimate joint of mxp. 3 broad, about 3 times as long as wide, strongly curved; 3rd joint of 2nd leg with 1 apical spine above, 2 below, outer margin of finger straight or concave, with a longitudinal keel on lower surface; hinder pair of spinules on telson midway between anterior pair and apex.

Length up to 16 mm.

Locality.—Delagoa Bay (coll. C. J. van der Horst. 1 specimen in coral).

Distribution.—Red Sea, Chagos Archipelago, Seychelles, Maldives, Andaman Is., East Indies.

Remarks.—The present specimen has lost both the 2nd legs.

Gen. Coralliocaris Stimpson

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 38.

1917. Borradaile, *l. c.*, p. 381 (part: excl. *Onycocaris*).

1922. Kemp, *l. c.*, pp. 121 (in key), 268 (key to species).

Carapace depressed, with or without hepatic spine; rostrum compressed, usually dentate. Inner lobe of mx. 1 slender. Distal endite of mx. 2 narrow, with setae only at tip. All three maxillipeds with exopods. 2nd legs similar or dissimilar. Dactyls of 3rd–5th legs with single claw, but with a large swollen, hoof-shaped basal protuberance. Associated with Madrepore corals.

Key to the South African Species.

1. Hepatic spine present. 2nd legs dissimilar . . . *lucina.*
2. Hepatic spine absent. 2nd legs similar . . . . *graminea.*

Coralliocaris lucina Nobili

Fig. 151, *i–m.*

1901. Nobili, Ann. Mus. Univ. Naples, n.s., I, no. 3, p. 5.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 842, pl. 26, figs. 55, 55, *a–h* (*lamellirostris* Stimpson).

1917. Borradaile, *l. c.*, p. 384, pl. 56, figs. 23 (*superba* var. *japonica* and *lucina*).

1922. Kemp, *l. c.*, p. 276, fig. 102 (mxp. 3).

1925. *Id.*, Rec. Ind. Mus., xxvii, p. 322.

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 174, pl. 47 (*lamellirostris*).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 392.

Rostrum with 3–6 (usually 4 or 5) teeth above, 1–3 (usually 2 or 3) below; antennal spine strong, supported by a keel extending to the hepatic spine. Mxp. 3 slender, antepenultimate joint 4 times as long as wide. 1st leg very slender, 5th joint longer than chela, finger and thumb less than length of palm. 2nd legs unequal and dissimilar, finger of larger chela angulate on outer margin, carinate; finger and thumb of smaller chela excavate on outer surface, with straight cutting-edge on inner side. 3rd–5th legs very stout, dactyl (fig. 151, *l–m*).

Length up to 16 mm. Transparent, carapace and abdomen longitudinally streaked and speckled with bright red, chelae colourless (Kemp).

Locality.—Delagoa Bay (coll. C. J. van der Horst. 1 specimen in coral).

Distribution.—Red Sea, Arabian coast, Ceylon, Chagos Archipelago, Maldives, Andaman Is., Nicobars, East Indies.

Remarks.—The present specimen has lost the larger chela.

Coralliocaris graminea (Dana)

1852. Dana, U.S. Explor. Exp., Crust., i, p. 573, pl. 37, fig. 3, *a–e* (*Oedipus g.*).

1884. Miers, Zool. H.M.S. *Alert*, p. 563.

1902. de Man, Abh. Senckenb. Ges., xxv, p. 840.

1905. Lenz, *ibid.*, xxvii, p. 381.

1922. Kemp, *l. c.*, p. 269, figs. 96, 97 (mxp. 3, 2nd leg).

1925. *Id.*, Rec. Ind. Mus., xxvii, p. 322.

1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 176, pl. 48.

1938. Gurney, Gt. Barrier Reef Exp. Rep., vi, p. 20, figs. 81–89 (larval stages).

1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 70, figs. 33–35.

Rostrum with 4–6 teeth above, 1 or 2 below, usually 5 and 2 resp. Hepatic spine absent. Mxp. 3 stout, antepenultimate joint 3 times as long as wide. 2nd legs equal or unequal but similar in structure, 4th joint in full-grown specimens with 1–2 denticles on upper apex and a larger one on lower apex, wrist with denticles on its upper border as

well as a large tooth on its lower border, outer margin of finger semicircular, inner surface with deep hollow to receive a large blunt process on thumb.

Length up to 23 mm. (Kemp). Pale green, dotted with yellow and dark brown, ♀ with red streaks on sides of abdomen (Kemp).

Locality.—St. Juan de Nova, Mozambique Channel (Lenz).

Distribution.—Red Sea, Zanzibar, Seychelles, Indo-Pacific to Japan.

Gen. Conchodytes Peters

1851. Peters, Ges. Naturf. Fr. Berlin, 18th February.
1852. *Id.*, MB. Ak. Wiss. Berlin, p. 588.
1917. Borradaile, *l. c.*, p. 392.
1922. Kemp, *l. c.*, pp. 121 (in key), 279.

Rostrum depressed, toothless, without dorsal carina, little if at all longer than antennal scale, carapace smooth, lower angle of orbit produced. Flagella of ant. 1 short. Mandible without palp. Inner lobe of mx. 1 very broad, setose. Distal endite of mx. 2 broad, setose along whole of inner margin. All three maxillipeds with exopods. 2nd legs unequal, with robust chelae. Dactyls of 3rd–5th legs biunguiculate, with flat basal protuberance. Commensal in bivalve Molluscs.

Conchodytes tridacnae Peters

1851. Peters, *l. c.*
1878. Hilgendorf, MB. Ak. Wiss. Berlin, p. 835.
1917. Borradaile, *l. c.*, p. 393.
1922. Kemp, *l. c.*, p. 283, fig. 105 (ant. 1 and telson).
1931. Chopra, Rec. Ind. Mus., xxxiii, p. 306.
1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 62, figs. 26, 27.

Conchodytes meleagrinae Peters

Fig. 151, *n*, *o*.

1851. Peters, *l. c.*
1878. Hilgendorf, *l. c.*, p. 836.
1888. Bate, Rep. H.M.S. *Challenger*, xxiv, p. 707, pl. 124, figs. 1, 2 (*Pontonia m.*).
1917. Borradaile, *l. c.*, p. 393, pl. 57, fig. 26.
1922. Kemp, *l. c.*, p. 285.
1940. Kubo, J. Imp. Fish. Inst. Tokyo, xxxiv, p. 58, figs. 24, 25.

Remarks.—Both these species are recorded from Ibo, Portuguese East Africa, by Hilgendorf, and will probably be found to occur within our limits (lat. 15° S.).

Both are distinguished from other species of the genus by the shape of the basal process on dactyls of 3rd–5th legs which is rounded and without a small tooth. For characters supposed to distinguish the two species see Hilgendorf, Borradaile, Kemp, and Kubo.

C. tridacnae lives in the Giant Clam (*Tridacna*), and *meleagrinae* in the Pearl Oyster (*Meleagrina*) and occasionally also in *Tridacna.*

Family CRANGONIDAE.

1900. Stebbing, Mar. Invest. S. Afr., i, p. 46 (key to genera at that date).

1910. Kemp, Fish. Irel. Sci. Invest. [1908], p. 134 (key to British genera).

1910. Stebbing, *l. c.*, p. 382.

1920. de Man, Siboga Exp. monogr., xxxix*a*, 3, pp. 247 *sqq.* (key to genera and list of species).

Rostrum short or spiniform. Carapace sometimes more or less sculptured. Eyes well developed (but in *Argis* concealed by carapace, and in *Prionocrangon* eye-stalks modified, cornea absent). Mandible simple, without palp (except in *Coralliocrangon* and *Naushonia*). Mxp. 2 with 7th joint small, attached obliquely at apex of 6th. Mxp. 3 with exopod, epipod present or absent. 1st leg strong, subchelate. 2nd leg slender, sometimes reduced, in one genus absent. 3rd leg slender; 4th and 5th legs more robust, sometimes with dilated dactyls. Telson tapering. No epipods on legs (but see *infra*). Exopods on legs; if present, on 1st leg only. Gills 5–8 plus 2–3 epipods.

Remarks.—The strong subchelate 1st pair of legs is a distinctive character.

A feature, which is not mentioned in the few books of reference available to me, is the presence of an epipodial process on the dorsal surface of the basal joint of 2nd leg in some species. It occurs in *Crangon vulgaris* as a blunt-ended process, but in *Sclerocrangon bellmarleyi* and *Pontophilus gracilis* as an acute process (figs. 152, *c*, 153, *d*). It is not present in any of the other South African species mentioned below. It is figured by Stebbing for *P. gracilis* (1905, pl. 25), but not by de Man for *P. occidentalis* var. *indica* (1920, pl. 21, fig. 63, *k*), but the figure here seems to be cut off at the critical part.

Sars (Norw. N. Atl. Crust., pl. 2) does not figure it for *Sclerocrangon salebrosus*.

The proposal to use *Crangon* instead of *Alpheus* and to substitute *Crago* for *Crangon* (and *Cragonidae* for *Crangonidae*) has been referred to under the family *Alpheidae* (see Stebbing, J. Linn. Soc. Lond., xxix (1905), pp. 332–334).

Key to the South African Genera.

1. Exopod on 1st leg, if present, rudimentary, minute (fig. 153, c). Gills 5–7 with lower apices curving backwards. . .
   a. 2nd leg as long as the others, finger and thumb shorter than palm.
      i. Carapace smooth . . . . . *Crangon.*
      ii. Carapace carinate and dentate . . . . *Sclerocrangon.*
   b. 2nd leg shorter, often much shorter, than the others, finger and thumb as long as, or much longer than, palm . . . . . *Pontophilus.*
2. Exopod on 1st leg well developed, setose. Gills 8, with lower apices curving forwards . . . . . *Aegeon.*

Gen. Crangon Fabr.

1910. Kemp, *l. c.*, p. 136.
1910. Stebbing, *l. c.*, p. 382.
1916. Kemp, Rec. Ind. Mus., xii, p. 379.
1920. de Man, *l. c.*, p. 249 (list of species only).
1931. Lebour, Proc. Zool. Soc. Lond., i, p. 3 (larva).

Rostrum depressed. Carapace without dentate keels. Eyes well developed. Basal process of ant. 1 apically acute. 1st leg without exopod. 2nd leg as long as 1st, chelate, finger and thumb less than half length of palm. Dactyls of 4th and 5th legs not dilated. Endopods of last 4 pleopods shorter than exopods, divided into 2 segments, without appendix interna. Gills 5–6 plus 3 epipods, lower apices of the gills curving backwards.

Remarks.—The genus is confined to the northern hemisphere with the exception of *C. antarcticus* Pfeffer (subgen. *Notocrangon* Cout.), and the following species.

Crangon capensis Stimpson

1860. Stimpson, Proc. Ac. Nat. Sci. Philad., p. 93.
1910. Stebbing, *l. c.*, p. 382.

Description inadequate. Length 22·5 mm. Simon's Bay, 12 fathoms. Not since recorded.

Gen. Sclerocrangon G. O. Sars

1910. Kemp, *l. c.*, p. 139.

1914. Stebbing, Ann. S. Afr. Mus., xv, p. 29.

1920. de Man, *l. c.*, p. 251 (list of species only).

Rostrum compressed and expanded below, or spiniform. Carapace sculptured, dentate and keeled, antero-lateral angle large. Eyes well developed. Basal process of ant. 1 apically acute. Mxp. 3 without epipod or arthrobranch. 1st leg without exopod. 2nd leg nearly as long as 1st, finger and thumb less than half length of palm. Dactyls of 4th and 5th legs not dilated. Endopod of last 4 pleopods as in *Crangon*. Gills 5 plus 2 epipods (Kemp, 1910), lower apices of gills curving backwards. Eggs large. Development abbreviated.

Remarks.—With the exception of the South African species, the genus has been found only in the northern hemisphere.

Sclerocrangon bellmarleyi Stebb.

Fig. 152.

1914. Stebbing, *l. c.*, p. 29, pl. 10 (Crust., pl. 74).

Integument minutely and sparsely granular or villose. Rostrum spiniform, directed upwards. A large upturned tooth behind rostrum, and a smaller one on the cardiac region; no denticle between these two teeth; hepatic spine and another between it and the dorsal cardiac tooth; a small denticle on lower (incurved) margin behind the antero-lateral spine, concealed by a series of plumose setae. Abdomen not carinate, 6th segment medio-dorsally channelled between blunt ridges, with a blunt dorso-lateral ridge on either side. Telson feebly concave dorsally, with small apical point and 2 pairs of minute dorso-lateral spinules distally. A pointed (epipodial) process on base of 2nd leg (fig. 152, *c*). Endopods of pleopods about half as long as exopods in ♀, less in ♂, becoming relatively shorter in 4th and 5th pleopods, no appendix interna; peduncle of 1st pleopod ♂ with very long spine-setae on inner margin proximally and distally, endopod with a single long spine-seta attached to posterior surface and projecting inwards (when appendage is *in situ*); in ♂ corresponding spines are present, but shorter and thicker, margins of endopod without long plumose setae. No sternal processes or spines on thorax or abdomen in ♀, in ♂ one spine on each of thoracic sternites 2–5 and abdominal sternites 1–5, those on 3rd and 4th thoracic sternites less

spiniform than the others, that on 5th abdominal sternite merely a small tubercle.

Length ♂ up to 35 mm., ♀ 37 mm. (Stebbing: ♀ 40 mm.).

Localities.—Off Cape Natal (Durban), 440 fathoms (Stebbing); Natal coast, 400 fathoms (S. Afr. Mus.).

Remarks.—One ♀, returned undissected by Stebbing, and a large ♂ not seen by him form the basis of the above description.

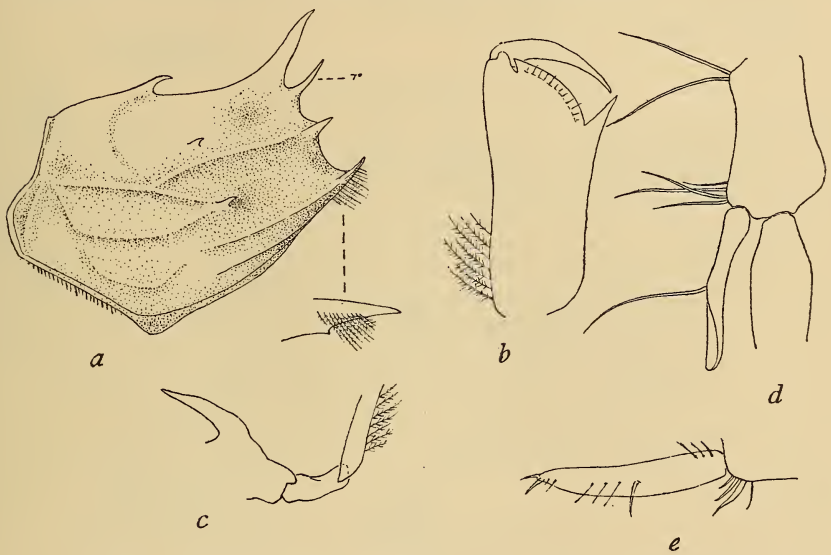


Fig. 152.—*Sclerocrangon bellmarleyi* Stebb. *a*, carapace, with ventral view of antero-lateral spine to show denticle on lower margin (*r*=rostrum). *b*, chela of 1st leg, outer view. *c*, base of 2nd leg with epipodial process. *d*, peduncle and endopod of pleopod 1 ♀, ordinary setae omitted. *e*, endopod of pleopod 1 ♂.

Gen. Pontophilus Leach

1900. Stebbing, Mar. Invest. S. Afr., i, p. 48 (*Philocheras*).
1905. *Id.*, *ibid.*, iv, p. 93.
1910. Kemp, *l. c.*, p. 143 (*Philocheras*) and p. 159 (*Pontophilus*).
1911. *Id.*, Rec. Ind. Mus., vi, pp. 5 and 8 *sqq.*
1915. Stebbing, Ann. S. Afr. Mus., xv, p. 71 (*Philocheras*).
1916. Kemp, Rec. Ind. Mus., xii, pp. 355–374 and 381–384.
1920. de Man, *l. c.*, pp. 252, 257 *sqq.* (list of species, key to species).

Rostrum depressed. Carapace with or without dentate keels. Eyes well developed. Basal process of ant. 1 truncate or rounded (*Philocheras*) or acutely pointed (*Pontophilus*). Mxp. 3 with or

without epipod and arthrobranch. 1st leg with or without exopod. 2nd leg shorter than 1st, finger and thumb longer or shorter than palm. Dactyls of 4th and 5th legs not dilated. Endopods of last 4 pleopods variable (see Kemp, 1916, p. 381), composed of 1 or 2 segments, with or without appendix interna. Gills 6–7 plus 2–3 epipods, apices of gills curving backwards.

Remarks.—Philocheras is now merged in *Pontophilus* for reasons given by Kemp in 1911 and 1916, and the proposal was accepted by de Man without comment.

Key to the South African Species.

1. Rostrum spiniform. 2 medio-dorsal teeth on carapace. A process (epipodial) on upper margin of basal joint of 2nd leg (fig. 153, *d*) . . . . . *gracilis.*
2. Rostrum short, blunt or bifurcate. No process on base of 2nd leg.
   - *a.* Outer margin of antennal scale without a tooth. Rostrum apically rounded-truncate.
     - i. Rostrum shorter than its basal width (fig. 153, *i*). Animal 20–23 mm. . . . . *megalocheir.*
     - ii. Rostrum as long as basal width (fig. 153, *l*). Animal 9–10 mm. . . . . *hendersoni.*
   - *b.* Outer margin of antennal scale with a tooth (fig. 153, *q*). Rostrum apically bifurcate . . . . . *sculptus.*

Pontophilus gracilis S. I. Smith

Fig. 153, *a–h.*

1905. Stebbing, *l. c.*, p. 94, pl. 25.
1910. *Id.*, *l. c.*, p. 383.
1920. de Man, *l. c.*, p. 260 (in key), pp. 264–269 (comparison).
1925. Balss, D. Tiefsee Exp., xx, p. 296.

Rostrum slender, usually slightly curved downwards, 1 or 2 pairs of minute denticles near base. Carapace with 1 gastric and 1 cardiac tooth on middle line, 1 hepatic and 1 epigastric laterally. Abdomen not carinate, 6th segment and telson slightly flattened or feebly channelled medio-dorsally. Mxp. 3 with epipod and arthrobranch. Basal process of ant. 1 lanceolate, apex acute; outer flagellum of ant. 1 thickened in ♂. 1st leg with rudimentary exopod (fig. 153, *c*); a spine on upper apex of 4th joint; a spine on lower, one on upper, and a third and larger one on middle of outer margin of 5th joint (see Stebbing's figure prp. 1, outer view). 2nd leg extending to middle

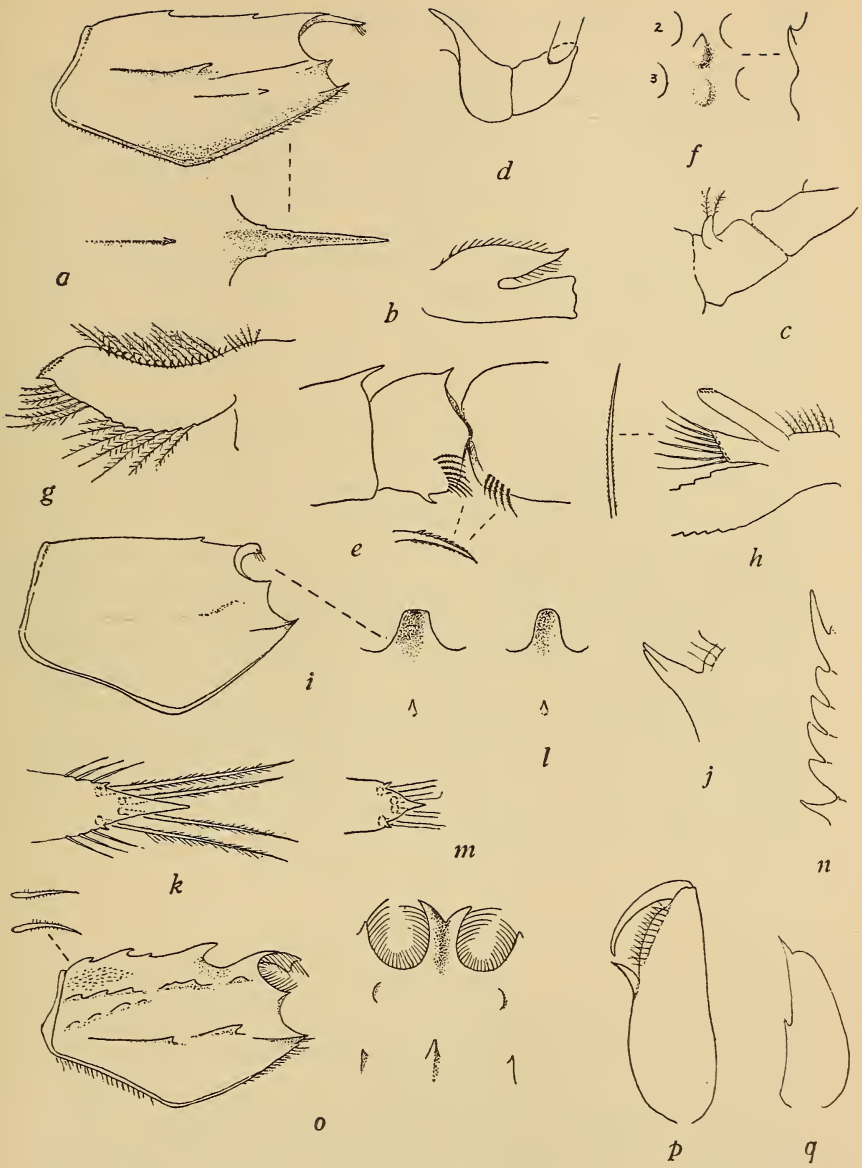


FIG. 153.—*Pontophilus gracilis* S. I. Smith. *a*, carapace, with dorsal view of rostrum further enlarged. *b*, basal process of 1st joint of ant. 1. *c*, base of 1st leg with exopod. *d*, base of 2nd leg with epipodial process, setae omitted. *e*, inner view of 5th joint, with apex of 4th and base of 6th, of 1st leg (long plumose setae omitted). *f*, 2nd and 3rd thoracic sternites, with profile. *g*, endopod of pleopod 1 ♂. *h*, endopod of pleopod 2 ♂.

Pontophilus megalocheir (Stebb.). *i*, carapace, with dorsal view of rostrum. *j*, thumb-like process of hand of 1st leg. *k*, apex of telson.

Pontophilus hendersoni Kemp. *l*, dorsal view of rostrum. *m*, apex of telson, setae not fully drawn in. *n*, profile of 1st–5th thoracic and 1st abdominal sternites.

Pontophilus sculptus (Bell). *o*, carapace, with dorsal view of rostrum further enlarged, and 2 setae. *p*, hand of 1st leg. *q*, antennal scale.

of 4th joint of 1st leg, its base dorsally with a pointed process (fig. 153, *d*), finger and thumb subequal to palm, gaping. 3rd leg very slender. Endopods of pleopods ♂ and ♀ well developed, with appendix interna, endopod of pleopod 1 ♂ (fig. 153, *g*), appendix masculina on pleopod 2 ♂ stout, shorter than appendix interna (fig. 153, *h*). A low rounded knob with forwardly-directed point on sternite between bases of 2nd legs, followed by a less conspicuous knob on 3rd sternite; both less conspicuous in ♀ than in ♂. Gills 7 plus 3 epipods. Eggs small, numerous.

Length ♀ up to 38 mm., ♂ smaller. Bright red (s.s. *Pieter Faure* log-book).

Localities.—Off Cape Peninsula, 250 fathoms (Stebbing); off west coast of Cape Peninsula, 190–470 fathoms (S. Afr. Mus.).

Distribution.—East coast of N. America; Bay of Bengal and Andaman Sea, Indian Ocean, Hawaiian Is.

Remarks.—The most that can be said of these specimens is that, as Stebbing said, they resemble *gracilis* very closely; and that they are not *occidentalis* var. *indica* of which de Man has figured the ♂ 1st and 2nd pleopods. Whether they are really *gracilis* or one of the closely allied species such as *junceus*, *profundus*, *abyssi*, must remain uncertain until the ♂ pleopods of these other species are described. Calman (1939, John Murray Exp., vi, p. 219) has compared one of Stebbing's Cape specimens with material from Aden, Zanzibar, and the Maldives, but says nothing about the ♂ pleopods.

Ovigerous ♀♀ were taken by the s.s. *Pieter Faure* in April to June.

Pontophilus megalocheir (Stebb.)

Fig. 153, *i–k*.

1915 (September). Stebbing, *l. c.*, p. 71, pl. 15 (Crust., pl. 79) (*Philocheras m.*, part: excl. the specimens No. A1316).

1920. de Man, *l. c.*, p. 262 (in key).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 127.

♀. Rostrum short and broad, scarcely as long as basal width, the subtruncate apex curved downwards. Carapace smooth, one gastric tooth in middle line, no lateral teeth. Abdomen not truly carinate, a slight indication of a short ridge near hind margin of 3rd segment, and segments 4–6 bluntly ridged. Telson ending in a narrow point, slightly or considerably longer than its basal width, flanked by a minute spinule on each side at base, with 2 pairs of long plumose

setae arising from ventral surface (exaggerated and incorrectly described and figured by Stebbing). Mxp. 3 with arthrobranch. Apex of lamellar portion of antennal scale nearly rectangular, projecting slightly beyond the spine (slightly exaggerated in Stebbing's figure). 1st leg without exopod; spinous process ("thumb") of 6th joint (hand) apically bifid. 2nd leg without process on basal joint, 3rd and 4th joints slender, each about 5 times as long as wide; finger and thumb longer than palm, not gaping. Endopods of pleopods ♀ well developed, a little more than half length of exopods, no appendix interna. A slender spiniform sternal process projecting forwards between bases of 1st legs (♀), 2nd–5th thoracic and all abdominal sternites smooth.

Length ♀ 23 mm.

Localities.—Off Cove Rock, East London, 25 fathoms (Stebbing; S.A.M. No. A1317); Delagoa Bay (Barnard).

Remarks.—Both the type and the Delagoa Bay specimens are ♀♀. Stebbing's description and figure of the telsonic apex are incorrect, and his figure of the projecting lamellar portion of the antennal scale is exaggerated. The hand of 1st leg does not seem unduly large for a Crangonid.

I have seen 3 specimens, not in very good condition, collected in False Bay by the University of Cape Town Ecological Survey, which may be referable to this species.

Pontophilus hendersoni Kemp

Fig. 153, *l–n.*

1915 (September). Stebbing, *l. c.*, p. 72 (*P. megalocheir* part: specimens No. A1316).

1915 (December). Kemp, Mem. Ind. Mus., v, p. 261, pl. 13, fig. 8, and text-fig. 25.

1916. *Id.*, *l. c.*, pp. 357 (in key), 372.

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 392.

Very closely allied to *megalocheir*, but distinguished by the smaller size, relatively narrower rostrum (fig. 153, *l*), shorter apical point on telson (fig. 153, *m*), less prominent lamellar portion of antennal scale, and relatively broader 3rd and 4th joints of 2nd leg (each about 3 times as long as wide).

A spiniform process on 1st thoracic sternite (relatively stronger than in *megalocheir* ♀) in both ♂ and ♀; in ♂ only 2nd–5th thoracic

sternites with dentiform keels, and abdominal sternites 1–4 each with a spiniform projection (fig. 153, *n*). Peduncles of pleopods broader in ♂ than ♀; endopods in both sexes moderately well developed on last 4 pairs, about half length of exopods but shorter in ♂ than in ♀; on 1st pleopod small in ♂, at most $\frac{1}{3}$ length of exopod; no appendix interna. Outer flagellum of ant. 1 thickened in ♂.

Length up to 9–10 mm. (♂ and ovig. ♀).

Localities.—33° 13′ S., 27° 39′ E. (south of East London), 37 fathoms (Stebbing; S.A.M. No. A1316, as *megalocheir* part); off Cape St. Blaize, from stomach of gurnard (S. Afr. Mus.).

Distribution.—Chilka Lake and Orissa coast, India, 0–4½ fathoms.

Remarks.—Kemp made no mention of sternal spines on the abdominal segments, and the present specimens do not show the dorsal tubercle on 3rd abdominal segment. Possibly the South African specimens represent a distinct species.

Pontophilus sculptus (Bell)

Fig. 153, *o–q*.

1910. Kemp, *l. c.*, p. 148, pl. 21, fig. 6, *a*, *b* (*Philocheras s.*).

1920. de Man, *l. c.*, p. 263 (in key).

1923. Odhner, Medd. Göteb. Mus., xxxi, p. 6.

1933. Monod, Bull. Com. Et. sci. Afr. occid. Franç., xv, p. 10, fig. 1, F (antennal scale) (pagination of separate copy).

1947. Barnard, Ann. Mag. Nat. Hist. (xi), 13, p. 392.

♀. Integument pubescent. Rostrum apically bifurcate, curved downwards, dorsally concave. Carapace with transverse depression behind rostrum, a medio-dorsal keel with 4 teeth, of which the foremost is prominent and the 2nd small or minute, a dorso-lateral series of partly disconnected short keels, the 1st rounded, behind orbit, 2nd and 3rd dentiform, below and slightly behind 1st medio-dorsal tooth, followed by 3 dentiform keels, a lateral keel divided into 2, both dentiform anteriorly; on hinder part of carapace between dorso-lateral and lateral keels an oblique row of 3–4 obscure short keels. Orbit fringed with long setae. Basal process of ant. 1 transversely oblong, the outer apex acute, upper apices of 1st and 2nd peduncular joints (viewed from the side) dentiform, 3rd joint with upper margin produced into 2 teeth. Antennal scale with tooth in middle of outer margin, lamellar portion not extending as far as apical spine. Mxp. 3 with arthrobranch. 1st leg, 4th joint with small tooth on upper apex, 5th with blunt tooth on inner lower margin, a sharp one on lower

outer margin, and a smaller one on outer upper margin, 6th joint widest proximally, thumb-like process strong, slightly sunken at base and mobile. 2nd leg extending to basal $\frac{1}{5}$ of hand of 1st leg, finger and thumb longer than palm, not gaping. A sternal spiniform process between bases of 1st legs. Abdomen sculptured, 3rd–5th segments medio-dorsally carinate, 6th segment channelled, no sternal processes in ♀. Telsonic apex as in *hendersoni* (*cf.* fig. 153, *m*). Endopods of pleopods about half length of exopods, both exopod and endopod shorter in 5th pleopod, appendix interna on 2nd and 3rd, reduced on 4th, absent on 5th.

Length ovig. ♀♀ 14 mm. and 21 mm.

Localities.—Off Cape Recife (Algoa Bay), 52 fathoms; off Gt. Fish Point, 30 fathoms; and off Cape Natal (Durban), 54 fathoms (S. Afr. Mus.).

Distribution.—Mediterranean; N.W. Europe; Cape Blanco; Port Alexander, Angola.

Remarks.—Kemp neither mentioned nor figured the short keel behind the orbit. Nevertheless there seems no reason to separate these specimens from *sculptus*. The pleopods of the ♀ agree with Kemp's statement (1916, *l. c.*, p. 381), but a ♂ from South Africa is not available for comparison. In the present specimens the "thumb" on hand of 1st leg is mobile, as it is in the Indian species *candidus* Kemp and *plebs* Kemp.

The 2nd medio-dorsal tooth is minute (fig. 153, *o*) in the two smaller ♀♀, as in Odhner's Angolan specimens, but in the larger ♀ is merely smaller than the 1st and 3rd teeth.

Kemp (1910, *l. c.*, p. 149) said the outer apex of 4th joint of 1st leg was without a spine in Irish specimens.

The ovigerous ♀♀ were taken in August, November, and December.

Gen. Aegeon (Guér. Men.) Kinahan

1900. Stebbing, Mar. Invest. S. Afr., i, p. 49 (references).

1910. Kemp, *l. c.*, p. 155.

1910. Stebbing, *l. c.*, p. 383 (authorship of genus, as spelt above, attributed to Kinahan).

1916. Kemp, Rec. Ind. Mus., xii, p. 374 (key to Indian species).

1920. de Man, *l. c.*, pp. 254 (list of species), 290 (key to species).

1947. Holthuis, Zool. Med., xxvii, p. 319 (*Pontocaris*).

Rostrum depressed. Carapace with longitudinal dentate keels. Abdomen sculptured, with keels and/or knobs. Eyes well developed.

Basal process of ant. 1 apically pointed. Mxp. 3 with arthrobranch, without epipod. 1st leg with setose exopod. 2nd leg a little shorter than or nearly as long as 1st leg, finger and thumb shorter than palm. Dactyls of 4th and 5th legs not dilated. Endopods of last 4 pleopods nearly as long as the exopods, composed of only one segment, with appendix interna, no appendix masculina in ♂. Gills 8 plus 2 epipods, apices of gills curving forwards.

Remarks.—To judge by the figures of the species of this genus, there appear to be two types of "thumb" on hand of 1st leg: the one spiniform and corresponding with that found in the species of *Pontophilus*; the other blunt, not outstanding, and appearing as a separated part of the thin cutting-edge of the hand (*cataphractus* and *lacazei*). Kemp (1916, *l. c.*, p. 374) examined all the then known species of *Aegeon*, but made no comment on this difference in the shape of the "thumb."

Key to the South African Species.

1. Most of the teeth on the 3 lateral keels flattened. An oblique row of 1–3 small tubercles between the medio-dorsal and dorso-lateral keels . . . . . *cataphractus.*
2. All teeth on the 3 lateral keels sharply dentiform. Areas between keels smooth . . . . . *lacazei.*

Aegeon cataphractus (Olivi)

Fig. 154.

1900. Stebbing, *l. c.*, p. 50 (references).
1910. *Id.*, *l. c.*, p. 383.
1916. Balss, Beitr. Kenntn. Meeresf. Westafrik., ii, p. 31.
1916. Kemp, *l. c.*, p. 375.
1920. de Man, *l. c.*, p. 292 (in key).
1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 17 (Miers' Senegambian specimen).
1939. *Id.*, John Murray Exp., vi, p. 222.

Integument firm, pilose. Rostrum very short, bifid. Carapace with 4 teeth on medio-dorsal keel, separated from rostrum by a transverse depression which is continued laterally as an hepatic groove dividing the 2 lateral keels; of these, the dorso-lateral one has 2 post-orbital teeth and 7 behind the hepatic groove, the lateral keel has 1 tooth behind the antennal angle and 7 teeth behind the groove; a ventro-lateral ridge from the antennal angle with 13–14 teeth; most

of the lateral teeth are flattened and slightly concave, and often inconspicuous in juveniles; on either side of 3rd medio-dorsal tooth a line of 1–3 tubercles or granules running obliquely forwards; one or two similar granules near the hepatic groove above the lateral keel. Abdominal segments 1, 5, and 6 each with a submedian keel on either side of median line, those on segment 6 divided into 3 short keels, segments 2–4 with median keel, which is posteriorly cleft on segments 2 and 3; lateral portions of the segments sculptured with blunt knobs and short ridges; pleurae angular below. In both sexes a spiniform



Fig. 154.—*Aegeon cataphractus* (Olivi). Carapace, and cutting-edge of hand of 1st leg.

forwardly-directed process between bases of 3rd legs, a blunt knob on hind margin of 5th thoracic sternite, and a spiniform process on each of abdominal sternites 1–5. Hand of 1st leg subcylindrical, the distal sharp cutting-edge oblique, non-setose, with a notch proximally, in other words the thumb-like process is blunt and not outstanding, finger only slightly curved. 2nd leg extending to basal third of hand of 1st leg. Telson trapezoidal in cross-section.

Length up to 41 mm.; smallest ovig. ♀ 29 mm.

Localities.—Near East London, 40 fathoms (Stebbing); off Gt. Fish Point, and coast of Natal and Zululand, 24–54 fathoms (S. Afr. Mus.).

Distribution.—Mediterranean; Senegambia; west coast of India, Ceylon, south Arabian coast.

Remarks.—The oblique series of tubercles or granules between the medio-dorsal and dorso-lateral keels is often reduced to a single granule, and often inconspicuous.

Ovigerous ♀♀ were taken by the s.s. *Pieter Faure* from December to February.

Aegeon lacazei (Gourret)

1888. Gourret, Ann. Mus. Hist. Nat. Marseille, iii, p. 143, pl. 12, figs. 19–23, pl. 13, figs. 1–10.

1910. Kemp, *l. c.*, p. 156, pl. 22, figs. 1–5.

1920. de Man, *l. c.*, p. 293 (in key).

1925. Calman, Fish. Mar. Biol. Surv., Rep. iv, Spec. Rep. 3, p. 17.

1939. *Id.*, John Murray Exp., vi, p. 222.

♀. Integument (as preserved) not very firm. Rostrum bifid. Carapace with 4 subequal teeth on medio-dorsal keel, a feeble hepatic depression laterally below the dorso-lateral keel, the latter with 8 sharp teeth, the anterior 2 near the orbit, lateral keel with 7–9 sharp teeth (decreasing in size posteriorly) behind hepatic depression and 1 in front of it; behind the antennal angle a smaller (but distinct) tooth and a minute one, followed by indications of some (about 10) flat teeth or little ridges (so feeble that they cannot be exactly counted). Abdominal segment 1 with 2 submedian keels, a dorso-lateral divided into two parts, and a lateral keel, all of which (incl. both parts of the dorso-lateral keel) end anteriorly in projecting teeth; segment 2 with a medio-dorsal keel ending anteriorly in a projecting tooth; 3rd and 4th segments with 3 keels, the dorso-lateral keels divergent posteriorly, 5th and 6th segments with a pair of keels, those on 6th segment bearing 2 denticles; pleurae rounded below. A small sternal spine between bases of 3rd legs, and a small sternal process on each of abdominal segments 1–5. Antennal scale twice as long as broad, outer margin slightly concave. 1st leg with exopod, cutting-edge of hand similar to that of *cataphractus*. 2nd leg reaching to middle of hand of 1st leg, no process on basal joint, 4th joint slightly shorter than 5th, 5th slightly longer than chela, finger and thumb a little shorter than palm, slightly gaping. Endopods of pleopods well developed, with appendix interna on 2nd–5th.

Length ovig. ♀ 23 mm. (Kemp: up to 32 mm.).

Localities.—Natal coast, 205 fathoms (Calman); off Umhloti River, Natal, 100 fathoms, and off Cape St. Blaize, 90 fathoms, 2 ovig. ♀♀ and 1 ? ♂ resp.; stockfish grounds off Table Bay, 1 mutilated specimen from stomach of *Macrurus* (S. Afr. Mus.).

Distribution.—Gulf of Marseilles, Bay of Biscay, S.W. Ireland; Zanzibar area; New Zealand.

Remarks.—The 2 ovig. ♀♀ and 1 ? ♂ agree with Kemp's description and figures. One of the 2 anterior teeth of the dorso-lateral keel in the above description corresponds with the "spinule" at base of rostrum in Kemp's description. The "thumb" of hand of 1st leg is proportionately slightly larger than shown in Kemp's figure 5.

The species differs from *orientalis* Hend. in having only 4 mediodorsal teeth on carapace, antennal scale longer than broad, and a definite hepatic depression.

Family ? (CARIDEA).

Gen. Problemacaris Stebb.

1921. Stebbing, Ann. Mag. Nat. Hist. (9), viii, p. 626.

1924. *Id.*, Ann. S. Afr. Mus., xix, p. 9.

Mandibles without palp, no cleft between incisor process and molar. 1st and 2nd maxillae normal. Maxillipeds and legs with long flagellate exopods. Mxp. 2 with 7th joint attached apically to 6th. Mxp. 3 slender, pediform. 1st and 2nd legs chelate, wrist of 2nd leg not subdivided. 3rd–5th legs simple. Telson linguiform, apically truncate.

Problemacaris spinetum Stebb.

1921. Stebbing, *l. c.*, p. 626.

1924. *Id.*, *l. c.*, p. 10, pls. 6, 7 (Crust., pls. 121, 122).

Rostrum pointed, without ventral teeth, dorsally with 4 large spines, followed by 2 on the carapace, a small denticle behind the last. Antero-lateral angle of carapace produced in a long spine, postero-inferior angle shortly acute. Abdominal segments with numerous spines. Ant. 1 with short acute basal process, and a long spine on upper margin of 1st peduncular joint. Peduncle of ant. 2 spinose, antennal scale with 2 apical spines. Pleopod 1 with short endopod; other pleopods with endopod nearly as long as exopod, with short appendix interna.

Length 15 mm.

Locality.—Off Cape Peninsula, 300 fathoms (Stebbing).

ADDENDA.

Page 31. *Platymaia turbynei* Stebb.

The following supplemental characters may be given.

First abdominal segment ♂ as long as wide, in ♀ a little wider than long; distal margin slightly protuberant, with indications of a median spine. Cheliped hand nearly parallel-sided, with long stiff (but pliable) bristles between the spines on inner and lower surfaces (as in Miers' figure of *wyville-thomsoni*, and Doflein's pl. 22, but not shown in the latter's excellent photograph on pl. 23). Fringes of setae on 6th and proximal part of 7th joints of 4th and 5th legs along the lower front margin and upper hind margin; on the 5th joint on upper margin only; 6th joint narrow throughout its whole length.

I have recently (1948) seen a ♂ specimen, carapace 45 × 45 mm., caught by the Fisheries Survey vessel s.s. *Africana*, 29° 53′ S., 31° 13′ E., 369 metres.

This specimen corresponds with the smaller specimens described on p. 31, except the carapace is granular and the spines greatly reduced; 1st abdominal segment nearly twice as wide as long with 3 spines on hind margin; cornea elongate oval (Doflein, *l. c.*, pl. 50, figs. 5, 6); 6th joints of 3rd–5th legs shorter than 4th joints and broader relatively to their length.

The conclusion can scarcely be avoided that this is an older example of *turbynei*. But it seems impossible to separate it from the East African examples described by Doflein as *wyville-thomsoni*, renamed *alcocki* by Rathbun (1916, 1918). If *turbynei* and *alcocki* (the former of course having priority) be regarded as one species, it means that the assumption of the adult characters proceeds at a slower rate relatively to the increase in size in the Natal area than farther north (Dar-es-Salaam).

P. turbynei and *alcocki* are sharply distinguished from the true *wyville-thomsoni* by the absence of an outwardly directed spine on inner upper orbital margin (Rathbun, 1918).

Page 108. *Tylodiplax blephariskios* (Stebb.)

A large number of specimens of both sexes collected at St. Lucia Bay, Zululand, by the University of Cape Town Ecological Survey (July 1948) provides the following supplemental details.

The cheliped of ♂ is much more robust than in Stebbing's figure

(presumably that of an immature ♂); the hand is almost as broad as its length (exclusive of thumb); the finger and thumb are widely gaping, so that the square tooth on the former does not meet the inner margin of the latter.

The most remarkable feature of the ♂ is the thick brushes of yellowish-brown fur on the forwardly directed surfaces (upper margin, upper half of outer surface, and whole of inner surface) of the 4th and 5th joints of 2nd–4th (1st–3rd walking) legs.

Pleopod 1 ♂, distal $\frac{1}{3}$ bent inwards against the basal $\frac{2}{3}$, which is gently curved and fringed on outer margin with plumose setae; on the distal $\frac{1}{3}$ in the bend is a triangular projection; apex truncate with a small projecting ovate lobe, and on the outer margin (but projecting medianly when the appendage is folded *in situ*) a slender sinuous apically acute process, with 3 spines midway along its margin.

Page 122. After *Varuna litterata* insert the following two genera belonging to the subfamily *Varuninae*:—

Ptychognathus onyx Alcock

See Kemp, Mem. Ind. Mus., v, p. 234, fig. 11 (♂ chela), 1915.
St. Lucia Bay, 1 ♂ (Univ. Cape Town Ecol. Surv., 1949).

Pseudograpsus erythraeus Kossmann

See Tesch, Siboga Exp. monogr., xxxix*c*, p. 97 (key to genus), 1918.
Kosi Bay, 2 ♂♂ (Univ. Cape Town Ecol. Surv., 1949).

Page 131. After *Sesarma eulimene* insert:

Sarmatium sp.

St. Lucia Bay and Kosi Bay (Univ. Cape Town Ecol. Surv., 1949).

Page 146. *Lissocarcinus laevis* Miers

Distinguished from *orbicularis* by the notched front. One from 28° 28′ S., 32° 25′ E., 27 metres (Fisheries Surv., 1948).

Page 152. After *Ovalipes punctatus* insert:

Elliptodactylus rugosus Doflein

1904. Doflein, D. Tiefsee Exp., vi, p. 94, text-figs. 7, 8, and pl. 30, figs. 1–3, pl. 32, fig. 7.

Seven specimens (♂♂ ♀♀) collected by the Fisheries Survey, 26° 36′ S., 14° 37′ E., 130 fathoms, agree with Doflein's description, except the 4th joint of mxp. 3 is not squarely truncate as in his fig. 7, but produced in a rounded lobe; the position of the sutures on the fused 3rd–5th abdominal segments is faintly indicated.

♂ 35 × 53 mm., ♀ 28 × 38 mm. (length to tip of median rostral tooth, and breadth incl. lateral teeth). Brick-red, under surface greyish; bright iridescent patches as follows: on antero-lateral margin between each pair of teeth, and a larger crescentric patch behind the last lateral tooth, in the smooth grooves between the regions of the carapace, anterior surface of the palp of mxp. 3, on the smooth distal portion of upper surface of arm of cheliped, the spine and other smooth areas on wrist, the smooth areas on upper surface of hand, and in the groove on upper margin of finger.

In the key to genera on p. 141 this genus falls into II.A.1, and is distinguished from *Ovalipes* by the basal joint of ant. 1 not being visible in dorsal view. The tridentate front distinguishes it from *Ovalipes punctatus*, but not from the North American *O. ocellatus*.

Pages 163, 164. *Gonioneptunus smithii* (McLeay)

Leene and Buitendijk (1949, Bijdr. Dierk., xxviii, p. 296, figs. 3, 4, *c*) have renamed the *Goniosoma truncatum* of Milne Edwards, *Charybdis* (*Goniohellenus*) *edwardsi*. If Ward is correct in considering *smithii* to be the same as *truncatus* M. Edw. (non Fabr.), then McLeay's name *smithii* must be accepted, and *edwardsi* L. & B. will fall into synonymy. Leene and Buitendijk (p. 298) state that *truncatum* was described from specimens from Malabar and Port Natal [= Durban].

Page 201. Add to the genera of *Hyperolissa*: *Halimede* de Haan.

A single specimen of a species of this genus found in Delagoa Bay (Lourenzo Marques Mus.).

Page 248. *Menippe rumphii* (Fabr.)

A specimen from Delagoa Bay submitted by the Lourenzo Marques Museum.

Eurüppellia annulipes (M. Edw.)

Kosi Bay (Univ. Cape Town Ecol. Surv., 1949).

Page 252. After *Lybia plumosa* insert:

Ozius rugulosus Stimpson

Kosi Bay (Univ. Cape Town Ecol. Surv., 1949).

Page 281. Gen. QUADRELLA

Key to the South African Species.

1. One spine on lateral margin . . . . . *coronata.*
2. Two spines on lateral margin . . . . . *bispinosa.*

Quadrella bispinosa Borrad.

1902. Borradaile, F. Geogr. Mald. Laccad., i, p. 266, fig. 58.

Specimens from off Chai Chai, Portuguese East Africa. Largest specimen (♀) length 14 mm., breadth 15 mm. (Lourenzo Marques Mus.).

Page 387. *Leucosia marmorea* Bell

One ♂, 42 × 46 mm. Natal (Fisheries Surv., 1948).

Pleopod 1 ♂ stout, calcified, corkscrew-like, seminal groove winding round spirally to the slender horny falcate apical projection; the apex of the calcified part forms a rounded setose knob ventro-laterally at the base of the horny apical projection.

Carapace and upper surface of arms, wrist and hand of chelipeds mauvy-russet, hinder part of carapace pale, with 2 pale brownish rings or oval spots, legs tinged with salmon.

Page 472. Gen. PORCELLANELLA White

1852. White, Voy. *Rattlesnake*, ii, p. 394.

Porcellanella triloba White, 1852

See Lenz, Abh. Senckenb. Ges., xxvii, p. 375, 1905.

One specimen, 28° 28′ S., 32° 25′ E., 27 metres (Fisheries Surv., 1948).

Zanzibar, Indian Ocean to China and Australia. A frequent habitat is between the leaf-like branches of *Pennatula.*

Porcellanella quadrilobata Miers

Off Inhambane, Portuguese East Africa, in Alcyonarian (Lourenzo Marques Mus.).

First described from Port Denison, N.E. Australia.

Page 546. After *Palinustus mossambicus* add the following genus:—

Gen. Linuparus Gray

1847. Gray in White, List Crust. Coll. Brit. Mus., p. 70.

1901. Ortmann, Zool. Jahrb. Abt. Syst., vi, p. 21 (*Avus*).

1909. Calman, Ann. Mag. Nat. Hist. (8), iii, p. 442.

1911. Gruvel, Ann. Inst. oceanogr., iii, 4, p. 26.

1916. de Man, Siboga Exp. monogr., xxxix*a*, 2, pp. 33, 36.

Carapace nearly quadrangular in cross-section, sides behind cervical groove vertical. Rostral processes fused. Flagellum of ant. 2 stout, not whip-like, not longer than body of animal. Pleopod 2 ♀ similar to those of the three following segments, endopod narrow and appendix interna large.

Linuparus trigonus (von Siebold)

1824. von Siebold [quoted from de Man].

1850. de Haan, Fauna Japon., p. 157, pls. 39, 40, L and M [quoted from Ortmann].

1911. Gruvel, *l. c.*, p. 26, text-fig. 10, and pl. 1, fig. 5.

Exp. 1–3 as described by Gruvel, except that exopods of mxp. 2 and 3 are setose, especially distally where the setae are plumose (the Paris Museum specimen is probably dry and the setae not very obvious). Sternite of abdominal segment 1 with a median denticle, sternites of segments 2–6 each with 2 denticles, the pair on 6th segment further apart than those on preceding segments, and followed by a second pair closer together, and some additional denticles laterally (in front of the soft anal membrane). Pleura of 1st abdominal segment with a single tooth, pleurae of segments 2–6 each with 3 main teeth and some smaller ones posteriorly, on segment 2 the 1st and 2nd teeth are equal but widely separated, the 3rd smaller and close to the 2nd, on segments 3–6 the teeth are equidistant, but the middle one (2nd) is noticeably larger than the 1st and 3rd, especially on segments 3–5. Claws of 1st and 2nd legs convex externally, with lateral and medio-internal fringes of setae. Claws of 3rd leg triquetral, with 3 fringes of setae; of 4th and 5th legs flattened externally, with 2 lateral fringes of setae. Genital openings ♂ on prominent coxal projections which nearly meet in the middle line.

Length of carapace 140 mm., of abdomen to end of telson 210 mm., total 350 mm. Breadth of carapace across outer antero-lateral angles 80 mm., behind cervical groove 70 mm. Flagellum of 2nd antenna 255 mm. Colour as preserved reddish brown.

Locality.—Off Inhambane, Portuguese East Africa, 180 fathoms, on rocky ground (Lourenzo Marques Mus., 1 ♂).

Distribution.—Japan; New South Wales.

Remarks.—The discovery of this Crayfish off the East African coast is noteworthy. Unfortunately there is little probability of obtaining further specimens, as the Director of the Lourenzo Marques Museum informs me that trawling has been discontinued in that area owing to the rocky nature of the ground. In Japan the species occurs *in locis saxosis* (de Haan, quoted by Ortmann). Another specimen of apparently the same species has recently been obtained off the coast of New South Wales (1949. McNeill, Austral. Mus. Mag., ix, p. 337, fig.), but misidentified as *Puerulus carinatus*.

Page 635. *Eusicyonia* Stebb.

Key to the South African Species.

1. Two post-rostral teeth. No abdominal sternal spines . . *longicauda.*
2. Five to seven post-rostral teeth. Sternal spines on abdominal segments 1–5 . . . . . cf. *lancifer.*

Eusicyonia cf. *lancifer* (Oliv.)

1913. de Man, Siboga Exp. monogr., xxxix*a*, p. 123 (references).

Three ♀ specimens from Delagoa Bay, submitted by the Lourenzo Marques Museum, appear to be this species.

Two, 50 and 57 mm. in length, have 3 rostral and 7 post-rostral teeth. Pleurae of abdominal segments 1–3 are unidentate, of 4 and 5 tridentate. Fingers of chelae 1½ times as long as palm.

The third specimen, 55 mm. in length, has 4 rostral and 5 post-rostral teeth, the hindmost of the latter has a longer posterior slope than the hindmost tooth in the other two specimens. Pleurae of abdominal segments 1 and 2 unidentate, of 3–5 tridentate.

All three specimens have a pair of sternal spines between the bases of both 1st and 2nd legs; and a strong sternal spine on each of abdominal segments 1–5, those on segments 1–3 inclined forwards, that on segment 4 vertical, and that on segment 5 inclined backwards. No horizontal keels on the sides of the abdominal segments.

E. lancifer is recorded from Japan, East Indies, Indian Seas and Ceylon.

A correct identification can only be made by examination and comparison of the ♂ petasma.

Page 638. *Sergestidae.*

Key to the South African Genera.

1. 4th and 5th pairs of legs present . . . . . *Sergestes.*
2. 4th and 5th pairs of legs absent, 5th pair in ♂ represented by coxal protuberances . . . . . *Acetes.*

Gen. Acetes M. Edw.

1830. Milne Edwards, Ann. Sci. Nat., xix, p. 350.
1917. Kemp, Rec. Ind. Mus., xiii, pp. 47 *sqq.*
1919. Hansen, Siboga Exp. monogr., xxxviii, p. 31.
1928. Okada, Ann. Mag. Nat. Hist. (x), i, p. 308 (tail organs).
1933. Menon, Bull. Madras Govt. Mus., iii, 3, p. 2 (development).
1934. Burkenroad, Bull. Bingham Oceanogr. Coll., iv, 7, p. 99.
1935. Boone, Bull. Vanderbilt Mar. Mus., vi, p. 101.
1940. Colefax, Rec. Austral. Mus., xx, pp. 341 *sqq.*
1948. Morris, Proc. Linn. Soc. N.S.W., lxxiii, pp. 1 *sqq.*, text-figs. (life-history).

Rostrum short, acute, with 1 or 2 denticles dorsally. Supra-orbital and hepatic spines present. Mx. 1 without palp, mx. 2 with a single lobe, mxp. 1 without palp. 1st–3rd pairs of legs with minute chelae; 4th and 5th pairs absent, but 5th pair represented in ♂ by coxal protuberances.

Remarks.—Atlantic and Indo-Pacific; coastal, frequently estuarine, or even fluviatile.

The ♀♀ are sometimes considerably larger than the ♂♂.

Acetes erythraeus Nob.

1905. Nobili, Bull. Mus. d'Hist. Nat. Paris, p. 394, fig. 1.
1906. *Id.*, Ann. Sci. Nat. (9), iv, p. 23, pl. 1, figs. 5, 5, *a–f.*
1917. Kemp, *l. c.*, p. 51, figs. 1, *c–e*, 2, *b*, 3, *b*, 4, *b*, 5, *a*, *d*, 7, *b.*
1933. Menon, *l. c.*, p. 2, pls. 1–3, figs. 1–38 (larval stages and adult).

Rostrum with 2 dorsal denticles. Outer flagellum of ant. 1 subequal to 1st peduncular joint, its shaft obscurely (?3) jointed, flagellar portion also obscurely jointed, in ♂ with a notch proximally, on the proximal slope of which are 4 short blunt curved spines directed forwards, and on the distal slope 1 spine directed backwards; a single long curved spine, distally serrulate, opposed to a row of 6 spines

on the flagellar portion. A curved antrorse spine between bases of 1st pleopods in both sexes. Uropodal organs present (*cf.* Okada).

Length ♂ 32 mm., ♀ 40 mm.

Locality.—Richards Bay, Natal (Univ. Cape Town Ecol. Surv., 1948, 1949, ♂♂ ♀♀, and immature).

Distribution.—Red Sea to Siam.

Remarks.—Although living a considerable distance from all the hitherto recorded localities, these specimens agree so well with *erythraeus* that they must be identified as this species.

INDEX

Synonyms in italics.

A

PAGE

aberrans (Ancylocaris) . . 794
abyssorum (Parapagurus) . . 450
Acanthephyra . . . 663, 666
acanthitelsonis (Acanthephyra) . 668
acanthomerus (Pilumnoplax) . 283
Acanthonychidae . . 10, 35
Acanthonyx 43
Acanthophrys . . . 58, 61
acanthopus (Dehaanius) . . 44
Acanthosoma 638
acanthus (Axius) . . . 449
acclivirostris (Parapenaeopsis) . 604
Acetes 822
Achaeopsis . . . 11, 23
Achaeus 11, 18
Achelous 141, 159
Achelous 160
Actaea 202, 227
actaeiformis (*Maxillothrix*) . . 337
Actaeodes 227
Actaeomorpha . . . 360, 361
Actumnus . . . 248, 271
aculeata (Micippa) . . . 63
adactyla (Hippa) . . . 404
admete (Thalamita) . . . 176
Aegeon 803, 811
aegibotus (Dromidia) . . . 322
Aegle 235
aeneus (Zosimus) . . . 210
aequabilis (Clibanarius) . . 435
affinis (Achaeus) . . . 19
affinis (Eucrate) . . . 295
affinis (Geryon) . . . 291
affinis (Leander) . . . 783
affinis (Leander) . . . 784
affinis (Metapenaeus) . . 600
affinis (Sesarma) . . . 127
affinis (Xantho) . . . 223
africana (Caridina) . . . 661
africana (Caridina) . . . 657
africana (Upogebia) . . . 519
africanum (Macropetasma) . . 606
africanum (Solenocera) . . 613
africanus (Gonioneptunus) . . 164
agulhasensis (Merhippolyte) . 690
Albunea 405
Albuneidae . . . 402, 405
alcocki (Calocaris) . . . 502

PAGE

alcocki (Eupagurus) . . . 460
alcocki (*Latreillopsis*) . . 341
alcocki (Thelxiope, Moloha) . 341
algoense (Solenocera) . . 616
Alope 687, 693
Alpheidae . . . 648, 724
Alpheus 725, 739
alphonsi (Heterocarpus) . . 684
Amalopenaeus 627
americanum (Gnathophyllum) . 765
Amphion 567, 574
Amphitrite . . . 155, 156
anaglyptus (Etisus) . . . 247
Anapagurus . . . 416, 465
anatum (Philyra) . . . 383
Anchistus . . . 770, 792
Ancylocaris . . . 770, 794
andamanensis (Penaeopsis *coniger*, var.) 593
andamanica (*Homola*) . . 340
andamanica (Nephrops) . . 528
andersoni (Pilumnus) . . 266
Angasia 687, 707
angolensis (Actaea) . . . 227
angulata (Goneplax) . . . 283
angulata (Heteronucia) . . 363
Aniculus 415, 430
aniculus (Aniculus) . . . 431
anisocheir (Synalpheus) . . 736
Anisopus 150
annulata (Charybdis) . . . 169
annulipes (Eurüppellia) . . 248
annulipes (Uca) 97
ANOMURA 400
antarcticus (Inachus) . . . 27
Antilibinia . . . 35, 36
arabicus (*Inachus*) . . . 43
Arcania 361, 375
arcticus (Sergestes) . . . 639
arcuata (Uca) . . . 90, 93
arcuatus (*Xantho*) . . . 236
areolata (Chlorodopsis) . . 214
Arete 725
argentata (Monomia) . . . 156
Aristaeopsis 622
Aristeomorpha . . . 582, 625
Aristeus 621
armata (Angasia) . . . 708
armata (Mursia) . . . 356

PAGE

armatum (Cardisoma) . . 109
armatus (Sergestes) . . . 643
arrosor (Pagurus) . . . 423
artificiosus (Conchoecetes) . . 308
asiatica (Emerita) . . . 403
asper (*Cancer*) 55
asper (Pagurus) 430
asper (Schizophrys) . . . 60
aspera (Eurynome) . . . 55
aspera (Schizophrys) . . . 60
asperrimus (Neolithodes) . . 411
Assecla 145
assisi (Upogebia) . . . 520
Astacidae 524
ASTACURA 524
Astacus 525
astathes (*Calcinus*) . . . 435
Atelecyclidae . . . 77, 194
Atelecyclus . . . 195, 196
Atergatis 201, 206
Atergatopsis . . . 201, 205
Athanas 725, 728
atlantica (Nephropsis) . . 530
Atya 654
Atyidae 647, 653
audouinii (Cyclograpsus) . . 132
auriculatus (Notostomus) . . 670
australis (Alope) . . . 693
austroafricana (Emerita) . . 403
austroafricana (Processa) . . 715
Autonomaeidae . . . 646
Avus 820
Axiidae 497, 498
Axius 498

B

bahamensis (Petrochirus) . 3, 416
balssi (Pomatocheles) . . 414
Banareia 227
banksii (Matuta) . . . 359
barbata (Thelxiope) . . . 338
barbatus (Cyclograpsus) . . 131
barnardi (Calocaris) . . . 503
barnardi (Ebalia, Lithadia) . 370
batei (Acanthephyra) . . . 668
bayonianus (Potamon) . . 191
beaumontii (Polycheles) . 569, 570
beaupresi (Harpilius) . . . 797
bellmarleyi (Sclerocrangon) . . 804
bellus (Liomera) . . . 238
Bentheocaris 666
Bentheogennema . . 582, 634
Benthesicymus 582
Betaeus 725, 733
bevisi (Euryplax) . . . 283
bicornis (Exodromidia) . . 327
bicornis (Gomeza) . . . 305
bicristimana (Mursia) . . 356
bidentatus (*Xantho*) . . . 236

PAGE

biguttatus (Portumnus) . . 142
bimaxillaris (Stylodactylus) . 652
bipustulatus (Ovalipes) . . 150
bisincisus (Alpheus) . . . 760
bispinosa (Latreillopsis) . . 343
bispinosa (Quadrella) . . 819
bisulcatus (Sergestes) . . . 641
bituberculata (Cryptodromidiopsis) 331
bituberculatus (Acanthophrys longispina, var.) . . . 62
biunguiculatus (Polyonyx) . . 480
Blastidae 10, 48
Blastus 39
blephariskios (Tylodiplax) . 108, 816
borradailei (*Urocaridella*) . . 775
boscii (Macrophthalmus) . . 103
bottegoi (Potamon) . . . 192
bouvieri (Corycodus) . . . 393
bouvieri (Parapagurus) . . 450
bovis (Rhynchoplax) . . . 72
BRACHYGNATHA . . . 9
BRACHYRHYNCHA . . 9, 75
brachytelsonis (Acanthephyra) . 667
BRACHYURA . . . 9
brasiliensis (Penaeus) . . 584
brevicarpalis (Periclimenes, Ancylocaris) 794
brevifalcatus (Achaeus) . . 20
brevirostris (Diogenes) . . 440
brevirostris (Diogenes) . . 443
brevirostris Pandalina) . . 676
brevis (Macrophthalmus) . . 101
brevispinosa (Charybdis variegata, var.) 170
brunneo-pictus (Paguristes oculatus, var.) 418
bürgeri (Panulirus) . . . 548

C

caecus (Eryoneicus) . . . 575
caelata (Chlorodopsis) . . 214
caeruleus (Penaeus) . . . 584
Calappa 346
Calappidae 346
Calastacus . . . 498, 502
calcaratus (Potamon) . . 193
Calcinus 415, 436
Calcinus 435
Calliactites 512
Calliadne 515, 522
Callianassa 505
Callianassidae . . . 497, 504
Callichirus 506
Callinectes 156
calmani (Merhippolyte) . . 692
Calocaris 498, 502
Camposcia . . . 11, 12
Campylonotus 646

	PAGE
canaliculata (Processa)	715
canaliculatus (Penaeus	590
canaliculatus (Penaeus)	590
Cancellus	415, 446
Cancridae	77, 194
capensis (Astacus)	526
capensis (Campylonotus)	646
capensis (Crangon)	803
capensis (Gennadas)	630
capensis (Leander)	789
capensis (Mamaia)	59
capensis (Neolithodes)	410
capensis (Plagusia)	136
capensis (Upogebia)	515
capensis (Upogebia)	519
capensis (*Virbius*)	702
Carcinaspis	370
Carcinides	3, 140
Carcinoplax	282, 286
Cardisoma	109
CARIDEA	576, 646
Caridina	654
carinata (Myra)	373
carinatus (Penaeus)	584
carinimanus (Macrophthalmus)	103
carinipes (Zozymodes)	211
cariosus (*Carpilodes*)	240
Carpilius	201, 203
Carpilodes	237
carnifex (Cardisoma)	110
Carupella	141, 146
Catapaguroides	416, 467
cataphractus (Aegeon)	812
catenata (Sesarma)	128
catenata (Sesarma)	130
CATOMETOPA	76
cavimana (Tetralia)	280
cavipes (Actaea)	229
cavipes (Coenobita)	470
caystrus (Pseudozius)	253
cellulosa (Actaea)	229
ceratophthalmus (Ocypode)	86
chabrus (Plagusia)	136
charon (Symalpheus)	738
Charybdis	142, 161, 165
Chiromantes	126
Chlorinoides	61
Chlorodius	213
Chlorodiella	202, 213
Chlorodopsis	202, 214
chlorophthalmus (Uca)	95
chlorophthalmus (Uca)	94, 97
Chlorotocus	676, 685
cinctimanus (Liomera)	238
Cleistostoma	83, 104
Clibanarius	415, 431
clibanarius (Clibanarius)	433
clypsydra (Dotilla)	99
coalita (Myra)	373
Coenobita	468
Coenobitidae	406, 468
comatum (Solenocera)	617
complectens (*Pseudocollodes*)	29
compressipes (Atergatis)	207
Conchodytes	770, 801
Conchoecetes	307, 308
coniger (Penaeopsis)	593
consobrinus (Dehaanius)	44
convexa (*Menippe*)	254
convexus (Carpilius)	205
coppingeri (*Paramithrax*)	62
Coralliocaris	770, 799
cordimanus (Ocypode)	84
cornuta (Dromidiopsis)	311
coronata (Quadrella)	281, 819
Corycodus	388, 393
Corystidae	77, 302
Cosmonotus	397, 399
costatus (Diogenes)	443
costatus (Diogenes)	440
Crago	803
Crangon	803
Crangon	724
Crangonidae	648, 802
crassicornis (Chlorotocus)	685
crassimanus (*Achelous*)	160
crassimanus (Alpheus)	756
crassus (Sergestes)	642
crebripunctata (Matuta lunaris, var.)	358
crenata (Thalamita)	172
crinipes (Geograpsus)	116
cruciata (Charybdis)	166
cristata (Mursia)	354
cristimanus (Mursia)	354
crucifera (Charybdis)	166
cruentatus (Atelecyclus)	198
Cryptodromia	307, 327
Cryptodromidiopsis	308, 329
ctenifera (Spirontocaris)	696
cuanensis (Eupagurus)	462, 465
cultrifer (Scyllarus)	557
cultrimanus (Xanthias)	242
cupheus (*Persephona*)	373
cursor (Ocypode)	88
cursor (Ocypode)	86
Cycloblepas	227
Cyclodius	215
Cyclodorippinae	388
Cyclograpsus	112, 131
CYCLOMETOPA	76
cymbifer (*Glyptoxanthus*)	231
cymodoce (Trapezia)	276
Cymonomus	388, 391
Cyrtomaia	12, 32

D

Daira	248
Dairoides	247, 258
Daldorfia	64

PAGE

dama (Schizophrys) . . . 61
danae (Thalamita) . . . 174
Dardanus 422
dasypus (Panulirus) . . . 549
debilis (Systellaspis) . . . 663
deformis (Pagurus) . . . 428
dehaanii (Porcellana) . . 476
dehaanii (Porcellana) . . 474
dehaanii (*Xantho*) . . . 216
Dehaanius . . . 35, 43
delagoae (Palaemon) . . . 776
delagoae (Palinurus gilchristi, var.) 543
delagoae (Thalamita) . . . 178
demani (Polycheles) . . . 570
dentata (Ranina) . . . 397
dentatus (Dehaanius) . . 44
dentatus (Enoplometopus) . . 532
dentatus (Etisus) . . . 244
dentatus (Glyphocrangon) . . 722
dentatus (*Grapsillus*) . . . 276
dentatus (Menaethius) . . 43
dentifrons (*Chlorodius*) . . 245
depressa (Actaea) . . . 229
depressa (Plagusia) . . . 134
depressus (Harpilius) . . . 796
depressus (Menaethius) . . 43
depressus (Pagurus) . . . 427
depressus (Potamon) . . . 190
deprofundis (Eupagurus) . . 464
deuteropus (Alpheus) . . 743
diacanthus (*Halimus*) . . . 53
diadumena (Ebalia) . . . 367
difficilis (Hapaloptyx) . . 496
digitalis (Trapezia) . . . 278
dimorphus (Parapagurus) . . 452
Diogenes 415, 439
disjunctipes (Corycodus) . . 393
dispersa (Galathea) . . . 486
dissodontonotus (Alpheus) . . 749
dissothrix (Dromidia) . . 321
distinguendus (*Xantho*) . . 219
diverticulatus (Hypocolpus) . 209
djiboutensis (Athanas) . . 732
Doclea 48, 49
dodone (Lophozozymus) . . 218
dofleini (Pinnotheres) . . 79
dolichodactylus (Palaemon) . 779
Dorippe 388
Dorippidae . . . 346, 387
Dorippinae 387
dormia (Dromia) . . . 310
dormia (*Dromia*) . . . 322
dornica (Dromia, typ. err.) . 310, 322
dorsalis (Heterocarpus) . . 684
dorsettensis (Inachus) . . 29
dorsipes (Dorippe) . . . 390
Dorynchus 23
Dotilla 83, 98
Dromia 307, 309
DROMIACEA . . . 9, 305

PAGE

Dromidia 307, 319
Dromidiopsis . . . 307, 311
Dromiidae 306
Dromiidea 306
dubius (Potamon) . . . 191
dubius (Potamon) . . . 189
duorarum (Penaeus) . . . 584
durbanensis (Hippolysmata) . 710
durbanensis (Rhynchocinetes) . 763
durbani (Penaeus) . . 584, 589
dussumieri (Uca) . . . 93
Dynomene 336
Dynomenidae . . . 306, 334

E

Ebalia 361, 363
Echinoplax 34
edulis (Processa) . . . 718
edwardsi (Charybdis) . . . 818
edwardsianus (Plesiopenaeus) . 624
edwardsii (Alpheus) . . . 759
edwardsii (Alpheus) . . . 756
edwardsii (Cleistostoma) . . 105
edwardsii (Jasus lalandii, var.) . 540
edwardsii (Leander) . . . 782
Elamena 67, 73
Elaphocaris 638
electra (Etisus) 245
elegans (Atergatis) . . . 218
elegans (Calcinus) . . . 438
elegans (Eurynome) . . . 57
elegans (Galathea) . . . 487
elegans (Gennadas) . . . 631
elegans (Hymenocera) . . 767
elegans (Latreillia) . . . 344
elegans (Marestia) . . . 136
elisabethae (Scyllarides) . . 561
Elliptodactylus 817
Emerita 402
emeritus (Emerita) . . . 403
engyops (Paguristes) . . . 421
Enoplometopus . 497, 525, 531
ensifera (Hippolyte) . . . 703
Epialtus 35
Epixanthus . . . 247, 259
Ergasticus 34
Eriphia 248, 273
erosa (Actaeomorpha) . . 361
Eryoneicus . . . 567, 574
Eryonidae . . . 535, 565
erythraeus (Acetes) . . . 822
erythraeus (Pseudograpsus) . 817
espinosus (*Chlorodius*) . . 244
Ethusa 348
Etisodes 243
Etisus 203, 243
Eualus 695
eucheir (Xeinostoma) . . 395
Eucrate 282, 295
Eudromia 314

PAGE

Eudromidia . . . 307, 314
eulimene (Sesarma) . . . 130
euopsis (Pagurus) . . . 427
Eupagurinae 416
Eupagurus . . . 416, 458
Eupalaemon 775
Euplax 103
Eurüppellia 248
Eurycarcinus . . . 247, 260
Eurynome . . . 48, 54
Euryplax 282, 283
eurysternus (Clibanarius) . . 434
Eusicyonia . . 582, 635, 821
Euxanthus 248
Evaxius 499
exanthematosa (Calappa) . . 352
exaratus (Xantho) . . . 223
Exhippolysmata . . . 709
eximia (Acanthephyra) . . 667
Exodromidia . . . 307, 324
exsculptus (Hypocolpus) . . 209
exsulcatus (Penaeus *semisulcatus*, var.) 584
extricatus (Diogenes) . . 445
exuens (Acanthephyra) . . 666

F

Faba . . . 692, 701, 725
fabimanus (Pagurus) . . . 427
falcifera (Macropodia) . . 16
fasciatus (Panulirus) . . . 553
fascicularis (Menaethiops) . . 39
fasciolatum (Gnathophyllum) . 765
faxoni (Eryoneicus) . . . 575
fenestrata (Dotilla) . . . 99
ferruginea (Trapezia) . . . 276
fissurus (Parapenaeus) . . 601
flammea (Calappa) . . 3, 347
flavipes (Grapsus) . . . 115
flavo-maculatus (Atergatopsis) . 206
flavopunctata (Trapezia) . . 278
floridus (Atergatis) . . . 207
foliacea (Aristaeomorpha) . . 625
fordii (Eriphia) 273
formosa (Macropodia) . . 17
fornasinii (Menippe, Myomenippe) 256
fossulatus (Cancer) . . . 229
fragifer (Pilumnus) . . . 269
frontalis (*Actaeodes*) . . . 245
frontalis (Alpheus) . . . 743
frontalis (Epixanthus) . . 259
frontalis (Eudromia) . . 315
fugax (Myra) 373
Funchalia . . . 581, 608
furcata (Stenocionops) . . 3, 58

G

gaimardii (Calcinus) . . . 439
Galacantha . . . 482, 494
Galathea 482
Galatheidae . . . 471, 481
GALATHEIDEA . . 401, 470
Galene 259, 261
gallus (Calappa) . . . 350
gamianus (Paguristes) . . 418
garstangi (Portumniodes) . . 142
Gecarcinidae . . . 76, 109
Gecarcinus 109
Gelasimus 89
Gelastocaris . . . 688, 713
Gennadas . . . 582, 627
Geograpsus . . . 111, 115
geometricum (Hymenosoma) . 68
Geryon 282, 290
giglioniana (Aristaeomorpha) . 625
gilchristi (Callianassa) . . . 509
gilchristi (Gennadas) . . . 633
gilchristi (Leander) . . . 784
gilchristi (Palinurus) . . 542, 554
gilesii (Glyphocrangon) . . 722
glaberrima (Tetralia) . . . 280
glabra (Psaumis) . . . 232
glacialis (Hymenodora) . . 665
gladiator (Monomia) . . . 156
Glaucothoë . 416, 417, 425, 449, 453
globosa (Philyra) . . . 380
globosus (Pinnotheres) . . 80
globulosa (Philyra) . . . 383
glomus (Ebalia) . . . 365
gloriosus (Sergestes) . . . 642
Glyphocrangon 719
Glyphocrangonidae . . 648, 718
Glyptoxanthus 227
Glypturus 505
Gnathochasmus 131
Gnathophyllidae . . 648, 764
Gnathophyllum 765
Gomeza 302, 304
Goneplacidae . . . 77, 281
Goneplax . . . 282, 283
Gonioneptunus . . . 141, 161
gracilipes (Alpheus) . . . 744
gracilipes (Metopograpsus messor, var.) 118
gracilis (Harpilius depressus, var.) 797
gracilis (Pontophilus) . . 606
graminea (Coralliocaris) . . 800
grandidieri (Eurycarcinus) . . 261
grandidieri (*Huenioides*) . . 41
grandidieri (Macrophthalmus) . 102
grandirostris (Galathea) . . 487
grandis (Sergestes) . . . 641
granulatus (*Cancer*) . . . 231
granulatus (*Pilumnus*) . . 229
granulatus (Polycheles) . . 569
granulosa (Ebalia) . . . 368
granulosa (Platypodia) . . 208
granulosus (Medaeus) . . 219
Grapsidae . . . 76, 110
Grapsillus 276
Grapsus 111, 112

PAGE

grapsus (Grapsus) . . . 113
grayi (Geograpsus) . . . 115
grayii (Cosmonotus) . . . 400
Grimaldiella 608
grimaldii (Athanas) . . . 729
grimaldii (Oplophorus) . . 662
Grimothea 488
guerinii (Albunea) . . . 405
guntheri (Inachus) . . . 27
guttata (Sesarma) . . . 126
guttata (Trapezia) . . . 277
guttatus (Pagurus) . . . 428
Gymnopleura . . . 9, 396

H

haeckelii (Acanthephyra) . . 668
Halimede 818
Halimede 269
Halimus 53
Haliporoides 619
Haliporus 619
Hapaloptyx . . . 495, 496
Harpiliopsis 796
Harpilius 770, 796
hastatoides (Hellenus) . . 158
Hellenus 141, 158
helleri (Actaea) . . . 228
Hemipenaeopsis . . . 608
hendersoni (Anapagurus) . . 465
hendersoni (Eudromia) . . 315
hendersoni (Pontophilus) . . 809
hepatica (Calappa) . . . 348
herbstii (Calcinus) . . . 437
hermitensis (Periclimenes) . . 794
hertwigi (Scyramathia) . . 50
Hetairocaris 693
Heterocarpus . . . 676, 682
heterochir (Pilumnoplax) . . 289
heterodon (Atelecyclus) . . 197
Heteronucia . . . 361, 362
Heteropilumnus . . . 268
Hexapus 283, 299
hibernicus (Eryoneicus) . . 575
hilarulus (Penaeopsis) . . 595
hilgendorfi (Macrophthalmus) . 103
Hippa 402, 404
hippeus (Ocypode) . . . 88
Hippidae 402
HIPPIDEA 401
Hippolysmata . . . 688, 709
Hippolyte . . . 687, 701
Hippolytidae . . . 648, 686
hippothoë (Alpheus) . . . 744
hirsutissima (Actaea) . . . 234
hirsutissima (Dromidia) . . 329
hirsutus (Pilumnus) . . . 263
hirta (Naxioides) . . . 52
hispida (Dynomene) . . . 337
hispidus (Stenopus) . . . 578
Holometopus 130

PAGE

Homaridae 524
Homarus 525
Homola 338
Homolidae . . . 306, 338
HOMOLIDEA 306
Hoplophoridae 662
Hoplophorus 662
horrida (Parthenope) . . . 64
Huenia 35, 40
Huenioides 35
Hyastenus . . . 48, 53
hydrophilus (Xantho) . . 223
Hymenicus 71
Hymenocera . . . 765, 767
Hymenodora . . . 663, 665
Hymenopenaeus . . 582, 619
Hymenosoma 67
Hymenosomatidae . . 11, 66
Hyperolissa . . . 200, 201
Hyperomerista . . . 200, 247
Hypocoelus 209
Hypocolpus . . . 210, 209

I

Ibacus 557, 563
idae (Palaemon) . . . 777
idella (Palaemon idae, var.) . 777
impressus (Xantho) . . . 220
Inachidae . . . 10, 11
Inachus 11, 27
incerta (Munida) . . . 492
incertus (Chlorotocus) . . 685
incisus (Ibacus) . . . 563
indica (Callianassa) . . . 512
indicus (Carcinoplax longimanus, var.) 287
indicus (Gennadas *scutatus*, subsp.) 634
indicus (Penaeus) . . . 588
indicus (Petrolisthes) . . . 479
indistincta (Caridina) . . . 650
inermis (Anchistus) . . . 792
inflatus (Potamon) . . . 90
infraciliaris (Pilumnus) . . 269
inhacae (Thalamita) . . . 179
insignis (Alpheus) . . . 744
integra (Thalamita) . . . 177
integrifrons (Pseudodromia) . 316
intermedia (Bentheogennema) . 634
intermedia (Galathea) . . 483
inversa (Uca) 94
investigatoris (Parapenaeus) . 602
ippeus (Ocypode) . . . 88
ischurodous (Geryon) . . 292

J

jallae (Potamon dubium, var.) . 191
japonica (Calappa) . . . 352
japonica (Coralliocaris *superba*, var.) 799

PAGE

japonicus (Anapagurus pusillus, var.) 467
japonicus (Aristeus) 626
japonicus (Carcinoplax longimanus, var.) 287
japonicus (Panulirus) . . . 550
japonicus (Penaeus) 590
Jasus 537
jedanensis (Synalpheus) . . 738
johnstoni (Potamon) . . . 194
jucundus (Betaeus) 733
Justitia 544

K

kempi (Eryoneicus) 575
kempi (Gennadas) 630
kingsleyi (Litocheira) . . 294
kraussi (Callianassa) . . . 506
Kraussia 195
kraussiana (Hippolyte) . . 702
kraussii (*Hippolyte*) . . . 688
kraussii (Pachygrapsus) . . 117
kuhlii (Ocypode) 87
kükenthali (Hippolysmata) . 712

L

labidolepta (Galathea) . . 483
lacazei (Aegeon) 514
lacertosus (Achaeus) . . . 19
Lachnopodus . . . 202, 236
lactea (Uca) 96
laevigatus (Heterocarpus) . . 684
laevimanus (Calcinus) . . 437
laevimanus (Eriphia) . . . 273
laevimanus (Etisus) . . . 244
laevioculis (Achaeus) . . . 20
laevis (Alpheus) 748
laevis (Eucrate) 295
laevis (Lissocarcinus) . . . 817
lagostoma (Gecarcinus) . . 109
lalandii (Jasus) . . 538, 554
lamarckii (Petrolisthes) . . 477
lamarckii (Xanthias) . . . 242
Lambrus 65
lamellirostris (Coralliocaris) . 799
lanata (Dorippe) 389
lanceopes (Nematocarcinus) . 671
lancifer (Eusicyonia) . . . 821
latens (Calcinus) 438
latens (Pseudodromia) . . 316
latirostris (*Harpilius*) . . . 794
latreillei (Macrophthalmus) . 102
Latreillia 342, 344
Latreilliidae . . . 306, 342
Latreillopsis . . . 342, 343
Latreutes . . . 687, 705
latus (Scyllarides) . . . 562
leachii (Cleistostoma) . . 107
Leander 770, 781
Lebbeus 695, 696

PAGE

Leontocaris . . . 687, 699
lepidactylus (Palaemon) . . 772
lepidota (Cryptodromidiopsis) . 332
leptochelis (Lybia) . . . 251
Leptodius 220
lessueri (Matuta) . . . 358
Leucifer 644
Leuciferidae . . . 580, 644
Leucisca 361, 370
leucodactyla (Trapezia) . . 278
Leucosia 361, 385
Leucosiidae . . . 346, 360
leviusculus (Alpheus) . . 745
limbatus (*Cancer*) . . . 208
Linuparus . . . 537, 820
liochele (Pylopagurus) . . 455
Liolophus 138
Liomera 202, 237
Lissocarcinus . . . 141, 145
Lithadia 361, 363
Lithodidae 407
Litocheira . . . 282, 293
litterata (Varuna) . . . 122
lividus (Geograpsus) . . . 116
lividus (Xanthias) . . . 242
lobidens (Alpheus) . . . 760
longecarinatus (Alpheus) . . 745
longicauda (Eusicyonia) . . 635
longicornis (Nematopagurus) . 467
longicornis (Penaeus) . . . 589
longicornis (Pilumnus) . . 265
longimana (Eurynome) . . 55
longimana (Philyra) . . . 382
longimanus (Carcinoplax) . . 287
longimanus (Palinurus) . . 544
longipes (Panulirus) . . . 550
longipes (Sesarma) . . . 124
longirostris (Elamena, Trigonoplax, unguiformis, var.) . . 75
longirostris (Enoplometopus) . 533
longirostris (Glyphocrangon) . 721
longirostris (Nematocarcinus) . 671
longirostris (Penaeus indicus, var.) 589
longirostris (Plesionika) . . 681
longispina (Acanthophrys) . . 62
longispina (Meticonaxius) . . 500
longispinis (Calocaris) . . 503
longitarsus (Clibanarius) . . 434
Lophactaea 208
lophopus (Liomera) . . . 238
lophos (Calappa) 351
Lophozozymus . . . 202, 218
lorina (Achaeus) 22
lottini (Alpheus) . . . 748
luciae (Alpheus) . . . 755
Lucifer 644
Luciferinae 644
lucina (Coralliocaris) . . . 799
lunaris (Matuta) . . . 358
Lupa 141, 152
Lupocyclus . . . 141, 157

PAGE

Lybia 247, 248
Lydia 248

M

mabahissae (Glyphocrangon) . 722
macgillivrayi (*Xantho*) . . 219
macleaii (Dehaanius) . . . 47
Macrobrachium 771
macrochirus (Alpheus) . . 743
macrodactylus (Etisus) . . 244
Macropetasma . . . 581, 605
Macrophthalmus . . 83, 101
Macropodia . . . 11, 13
Macroterocheir 771
maculata (Trapezia) . . . 277
maculatus (Carpilius) . . 203
maculatus (*Grapsillus*) . . 278
maculatus (Grapsus) . . 113
maculatus (Leander) . . . 782
maenas (Carcinides) . . 3, 140
major (*Nautilograpsus*) . . 120
major (Upogebia) . . . 515
makrognathus (Spirontocaris) . 698
makrothrix (Cancellus) . . 447
malabaricus (Alpheus) . . 761
malabaricus (Alpheus) . . 752
maldivensis (Pilumnus) . . 264
malensis (Alpheus bisincisus) . 760
Mamaia 58
Mamaiidae . . . 11, 58
Marestia 136
margaritatus (Dairoides) . . 258
marginatus (Atergatis) . . 207
marginatus (*Carcinaspis*) . . 371
marionis (Uca) . . . 90
marleyi (Hippolysmata) . . 712
marmoratus (Saron) . . . 688
marmorea (Leucosia) . 386, 819
martensi (Callianassa) . . 506
martensii (*Menippe*) . . . 213
martensii (Scyllarus) . . . 558
martia (Plesionika) . . . 679
Mastigopus 638
mathaei (Elamena) . . . 73
mathaei (Elamena) . . . 75
Matuta 346, 357
Matutinae 346
mauritanicus (Palinurus vulgaris, var.) 544
mauritiana (Callianassa) . . 506
mauritianus (Lupa) . . . 153
mauritianus (Palinurus longimanus, var.) . . . 541, 544
mawsoni (Marestia) . . . 136
Maxillothrix . . . 199, 336
mcleayi (Portumnus) . . . 143
Medaeus 202, 218
megalocheir (Pontophilus) . . 808
megalocheir (Pontophilus) . . 809
Megalops 136

PAGE

megistos (Pagurus) . . . 425
meinerti (Sesarma) . . . 125
meleagrinae (Conchodytes) . . 801
Melia 248
membranaceus (*Penaeus*) . . 612
Menaethiops . . . 35, 38
Menaethius . . . 35, 41
Menippe . . . 247, 248, 256
Menippe 254
merguiensis (Charybdis) . . 168
Merhippolyte . . . 687, 690
messor (Metopograpsus) . . 118
Metapenaeopsis . . . 592
Metapenaeus . . . 581, 596
Metaxius 499
Meticonaxius . . . 498, 499
Metopograpsus . . . 111, 118
Micippa 58, 62
micronyx (Cryptodromia) . . 330
Microprosthema . . . 577
Miersiidae 662
miles (Diogenes) . . . 440
minikoensis (Athanas) . . 731
minutus (Planes) . . . 120
minutus (*Planes*) . . . 294
modestus (*Pandalus*) . . . 676
moebii (Xenophthalmodes) . 297
mogiensis (*Metapenaeus*) . . 595
Moloha 341
monoceros (Menaethius) . . 43
monoceros (Metapenaeus) . . 597
monodon (Penaeus) . . . 584
monodon (Penaeus) . . . 588
monodous (Cryptodromia) . . 328
Monomia 141, 155
monticulosus (Liomera) . . 240
monticulosus (Phymodius) . . 217
mosambicana (Lambrus *serratus*, var.) 65
moseleyi (Pleistacantha) . . 34
mossambicus (Palaemon) . . 778
mossambicus (Palinustus) . . 545
mossambicus (Petrolisthes) . . 479
mossambicus (*Virbius*) . . 704
mucronatus (Latreutes) . . 706
multispinosa (Latreillopsis) . 343
Munida 482, 488
Munidopsis . . . 482, 493
muricata (Doclea) . . . 49
murigera (Xanthasia) . . 81
murrayi (Cyrtomaia) . . . 33
Mursia 346, 353
mutica (Megalops) . . . 136
Myomenippe . . . 247, 256
Myra 361, 372

N

naifaroensis (Athanas) . . 731
nana (Stereomastis) . . 573, 575
Nasinatalis 393

	PAGE
nasutus (*Platyonichus*)	142
natalensis (Callianassa)	511
natalensis (Caridina nilotica, var.)	687
natalensis (Carupella)	147
natalensis (Eurycarcinus)	261
natalensis (*Galene*)	259
natalensis (Latreutes)	706
natalensis (Pachycheles)	472
natalensis (Palaemonetes)	791, 794
natalensis (Palinurus gilchristi, var.)	542
NATANTIA	575
natator (Charybdis)	169
Naupliosoma	536, 538
Nautilocorystes	302
Nautilograpsus	120
Naxia	52
Naxioides	48, 52
Neaxius	498
Nematocarcinidae	647, 670
Nematocarcinus	671
Nematopagurus	416, 467
Neoliomera	203, 240
Neolithodes	407
Neoxanthias	221
Nephrops	525, 527
Nephropsidae	524
Nephropsis	525, 529
Neptunus	153–159
nexa (Galathea)	486
niger (Chlorodius)	213
nigrifrons (Tetralia glaberrima, var.)	280
Nika	715
nilotica (Caridina)	657
nilotica (Potamon)	189
Nisto	556, 561, 567
nitescens (Athanas)	729
nitida (Uca)	91
nitidus (Plesiopenaeus)	622
nitidus (Sphaerozius)	254
nitidus (Uroptychus)	495
nodipes (*Actaeodes*)	232
nodulosa (Actaea)	228
notabilis (Alpheus)	747
Notosceles	399
Notostomus	663, 669
Nursia	368

O

	PAGE
obesomanus (Alpheus)	743
obesus (Potamon)	192
obscurus (Phymodius)	217
obtusus (*Xantho*)	238
occidentalis (Enoplometopus)	532
occidentalis (Ogyrides)	728
ocellata (Nautilocorystes)	303
octodentatus (Nautilocorystes)	303
oculatus (Paguristes)	418
Ocypode	83
Ocypodidae	76, 82
ocyroe (Atergatis)	207
Oedipus	800
Oeidea	304
Ogyrides	725
Ogyris	725
oktahedros (Cryptodromia)	328
Ommatocarcinus	282, 285
onyx (Ptychognathus)	817
Oplophoridae	647, 662
Oplophorus	662
orbiculare (Hymenosoma)	68
orbicularis (Achelous)	159
orbicularis (Lissocarcinus)	145
orbitospinis (Pilumnus)	264
orientalis (Actaea rüppellii, var.)	235
orientalis (Alope)	693
orientalis (Charybdis)	170
orientalis (Hippolyte)	704
orientalis (*Merhippolyte*)	712
orientalis (Parathranites)	148
orientalis (Thelxiope)	340
orientalis (Thenus)	565
orientalis (*Thenus*)	558
orientalis (Uca annulipes, var.)	97
ornatus (Panulirus)	552
ornatus (Petrolisthes)	479
ortmanni (*Menippe*)	254
Ortmannia	654
Ostracotheres	78, 81
ostrearius (Pinnotheres)	79, 80
Ovalipes	141, 150
ovalis (*Remipes*)	404
OXYRHYNCHA	9
OXYSTOMATA	9, 345
Ozius	819

P

	PAGE
Pachycheles	471, 475
pachydactylus (*Xantho*)	236
Pachygrapsus	111, 116
pacifica (Huenia)	41
pacificus (Hippa)	404
pacificus (Leander)	784
pacificus (Phye)	651
padavensis (Clibanarius)	433
paederus (Marestia)	136
Paguridae	406, 414
PAGURIDEA	401, 406
Pagurinae	415
Paguristes	415, 417
Pagurus	415, 422
Palaemon	770
Palaemonetes	770, 791
Palaemonidae	648, 769
Palaemoninae	770
PALINURA	535
Palinurellus	537
Palinuridae	535
Palinurus	537, 541

PAGE

Palinustus . . . 537, 544
Pandalidae . . . 647, 675
Pandalina 676
Panulirus . . . 537, 547
Paracleistostoma . . . 104
Paramithrax 61
Parapagurus . . . 416, 450
Parapalaemon 780
Parapasiphaë 649
Parapenaeopsis . . . 581, 604
Parapenaeus . . . 581, 600
Parapilumnus . . . 248, 269
Parasesarma 127
Parathranites . . . 141, 148
parazebra (Eupagurus) . . 459
parkeri (Jasus) 540
paronae (Gelastocaris) . . 714
Parribacus . . . 557, 565
Parthenope 64
Parthenope 65
Parthenopidae . . . 11, 63
parvula (Actaea) . . . 234
parvula (Actaea) . . . 229
parvidentatus (Nematocarcinus) . 674
parvirostris (Alpheus) . . 753
Pasiphaë 651
Pasiphaëidae . . . 647, 648
paucipara (Caridina nilotica, var.) 657
paulensis (Geryon) . . . 291
paulsoni (Leontocaris) . . 699
pavimentatus (Pagurus) . . 426
pax (Spirontocaris) . . . 696
pectinifera (Spirontocaris) . . 696
pedunculatus (Pagurus) . . 429
pelagica (Lupa) . . . 153
Pelagopenaeus . . . 581, 608
Pelias 657
Penaeidae 580
PENAEIDEA . . . 576, 579
Penaeopsis . . . 581, 592
Penaeus 581, 582
penicillatus (Panulirus) . . 550
penicillifer (Leucifer) . . . 645
pennifera (Latreillia) . . . 344
Pentacheles 568
pentagonalis (Cryptodromia) . 328
Percnon 112, 138
Periclimenes . . . 770, 794
peringueyi (Leander) . . . 784
perlatus (*Chlorodius*) . . . 214
perlatus (Coenobita) . . . 469
perlatus (Pilumnoides) . . 257
perlatus (Potamon) . . . 183
peronii (Glaucothoë) . . . 417
peronii (Ibacus) . . . 563
Persephona 373
Petalomera . . . 307, 312
petersii (Palaemon) . . . 780
petersii (*Podopisa*) . . . 52
Petrochirus . . . 3, 416
Petrolisthes . . . 472, 477

PAGE

phaenomma (Leucisca) . . 371
phalangium (Stenorhynchus) . 14
philippii (Penaeopsis) . . 592
philippinensis (Penaeopsis) . 592
Philocheras 805
Philonicus 619
Philyra 361, 376
Phlyxia 363
phorcus (Sergestes) . . . 641
Phye 649, 651
Phyllosoma . . 536, 554, 556
561, 562, 566
Phymodius . . . 202, 215
picta (Matuta) 359
picta (Sesarma) . . . 127
picta (Thalamita) . . . 175
pictus (Enoplometopus) . . 532
pilosimanus (Parapagurus) . . 450
Pilumnoides . . . 247, 256
pilumnoides (Dynomene) . . 337
Pilumnoplax . . . 282, 288
Pilumnus 248, 262
pinnae (*Pontonia*) . . . 792
Pinnotheres 78
Pinnotheridae . . . 76, 77
pisifer (Parapilumnus) . . 269
pisum (Pinnotheres), and footnote to fig. 16 80
placens (Eupagurus) . . . 462
Plagusia 112, 133
Planes 111, 120
planipes (Matuta) . . . 357
planissimum (Percnon) . . 138
Plastocrangon 719
platyarthrodes (Speodromia) . 334
platyceros (Cyrtomaia) . . 33
platychira (Plilyra) . . . 382
Platylambrus . . . 64, 65
Platymaia 12, 30
Platyonichus . . . 142, 195
Platyonychus 150
Platypodia . . . 201, 208
Platyozius 295
plebejus (Penaeus) . . . 583
Pleistacantha . . . 12, 34
Pleoticus 619
Plesionika . . . 676, 679
Plesiopenaeus . . . 582, 621
plicata (Sesarma) . . . 127
plicatus (Pachygrapsus) . . 117
plumosa (Lybia) . . . 252
Podopisa 52
polita (Philyra) 380
politus (Petrolisthes) . . . 478
pollicaris (Eupagurus) . . 460
Polycheles . . . 567, 568
Polycheles 570
polyodous (Pachygrapsus) . . 118
Polyonyx . . . 472, 480
polyphagus (Panulirus) . . 548
Pomatocheles 413

PAGE

Pomatochelidae . . 406, 413
Pontocaris 811
Pontoniinae . . . 770, 791
Pontophilus . . . 803, 805
Porcellana . . . 472, 473
Porcellanella . . . 472, 819
Porcellanidae 471
Portumniodes 142
Portumnus . . . 141, 142
Portunidae . . . 77, 139
Portunus 152
postulans (*Nursia*) . . . 368
Potamon 180
Potamonautes 180
Potamonidae . . . 77, 179
pransor (Platylambrus) . . 66
Problemacaris 815
Processa 715
Processidae . . . 648, 715
proporcellana (Kraussia) . . 195
proteus (Hippolyte) . . . 703
proteus (Huenia) . . . 41
prymna (Thalamita) . . . 174
Psaumis 231, 232
Pseudibacus . . . 556, 561
Pseudocollodes 27
Pseudodromia . . . 307, 315
Pseudograpsus 817
Pseudozius . . . 247, 252
Pseudozius 295
Ptychognathus 817
pubescens (Lupa) . . . 153
pubescens (Neoliomera) . . 241
Puerulus . . . 536, 554, 556
pugil (Lybia) 251
pugilator (Diogenes) . . . 440
pugnatrix (Dynomene) . . 337
pulchella (Actaea) . . . 228
pulchella (*Xaiva*, Portumnus) . 142
pulchellus (Lissocarcinus) . . 145
pulcher (Ommatocarcinus) . . 285
pulchricaudatus (Penaeus) . . 591
punctata (Myra) 373
punctata (Persephona) . . 373
punctata (Philyra) . . . 377
punctata (Philyra) . . . 381
punctatus (Cyclograpsus) . . 131
punctatus (Ovalipes) . . . 150
punctulatus (Pagurus) . . . 425
pungens (*Echinoplax*) . . . 34
purpurea (Acanthephyra) . . 668
pusilla (Micippa) . . . 63
pusillus (Anapagurus) . . 465
pygmaeus (Latreutes) . . 707
Pylochelidae 413
Pylopagurus . . . 416, 453

Q

quadrata (Sesarma) . . . 127
Quadrella . . 248, 280, 819

PAGE

quadridens (*Pugettia*) . . . 44
quadridentata (Dorippe) . . 390
4-dentatus (Dehaanius) . . 46
quadridentatus (*Mithrax*) . . 60
quadrilobata (Porcellanella) . 819
quadrispinosa (Acanthephyra) . 668
queketti (Mamaia) . . . 59
quemvis (Platylambrus) . . 65
quinquedens (Geryon) . . 291
quinquedentata (Penaeopsis) . 593
quinquedentatus (Xantho) . . 225
quoianus (Leander, Palaemon) . 782

R

Ranina 397
ranina (Ranina) . . . 397
Raninidae 396
Raninoides . . . 397, 399
rapacida (Alpheus) . . . 750
rapax (Alpheus) . . . 752
regius (Panulirus) . . . 551
Remipes 404
REPTANTIA 9
reticulata (Sesarma) . . . 128
retusa (Camposcia) . . . 12
rhadames (Upogebia, Calliadne) . 523
Rhynchocinetes . . . 763
Rhynchocinetidae . . 648, 762
Rhynchoplax . . . 67, 71
robillardi (Naxioides) . . 53
rosaceus (Paguristes) . . . 420
roseus (Atergatis) . . . 207
rostrata (Galacantha) . . 494
rostrata (Macropodia) . . 14
rostridentatus (Aristaeomorpha) . 626
rotunda (Pseudodromia) . . 317
rotundatus (Lupocyclus) . . 148
rotundicaudata (Callianassa) . 512
ruber (Liomera) . . . 238
rubidus (*Typhlocarcinus*) . . 297
rudis (Palaemon) . . . 778
rufescens (Petrolisthes) . . 477
rufopunctata (Actaea) . . 228
rufopunctata (Trapezia) . . 278
rugatus (Liomera) . . . 237
rugosus (Coenobita) . . . 469
rugosus (Elliptodactylus) . . 817
rugosus (Scyllarus) . . . 560
rugulosa (Kraussia) . . . 195
rugulosus (*Euxanthus*) . . 248
rugulosus (Ozius) . . . 819
rumphii (Dromia) . . . 310
rumphii (Menippe) . . 248, 818
rüppellii (Actaea) . . . 235

S

sabaea (Neoliomera) . . . 241
sagittarius (Stenorhynchus) . 13
salamensis (Ebalia) . . . 368
saldanhae (Ogyrides) . . . 726

PAGE

saldanhae (Spirontocaris) . . 698
sancti-pauli (Munida) . . 489
sanguineus (Xantho) . . . 220
sanguinolenta (Lupa) . . 154
Saron 687, 688
savignyi (Actaea) . . . 231
savignyi (Upogebia, Calliadne) . 522
scabra (Ranina) . . . 397
scabricula (Eriphia) . . . 275
scabriuscula (Philyra) . . 381
scandens (*Nursia*) . . . 368
Schizophrys . . . 58, 60
Sclerocrangon . . . 803, 804
sculpta (Stereomastis) . 572, 575
sculptilis (Etisus) . . . 244
sculptus (Glyphocrangon) . . 719
sculptus (Hypocolpus) . . 209
sculptus (Pontophilus) . . 810
scutatus (Gennadas) . . . 634
scutellatus (Dehaanius) . . 47
scutellatus (*Epialtus*) . 35, 47
scutellatus (Eurynome aspera, var.) 56
Scylla 141, 160
Scyllaridae . . . 535, 556
Scyllarides . . . 556, 561
Scyllarus . . . 556, 557
Scyramathia . . . 48, 49
Scytoleptus . . . 498, 499
sebana (Eriphia) . . . 273
semilaevis (Plesionika martia, var.) 679
semisulcatus (Penaeus) . . 588
semisulcatus (Penaeus) . 584, 588
semoni (Munida) . . . 491
senex (Diogenes) . . . 446
septemdentatus (Atelecyclus) . 197
septemspinosa (Arcania) . . 375
Sergestes 638, 822
Sergestidae . . 580, 637, 822
serrata (Scylla) 160
serratifrons (Raninoides) . . 399
serratus (Lambrus) . . . 65
serratus (Stylodactylus) . . 652
serrifer (Leander) . . . 789
serripes (Scytoleptus) . . 499
Sesarma . . . 112, 122
seticornis (Stenorhynchus) . . 13
setifer (Actumnus) . . . 271
setifer (Pagurus) . . . 426
setifer (Pagurus) . . . 428
sexdentata (Charybdis) . . 168
sexpes (Hexapus) . . . 299
sexspinosa (Acanthephyra) . . 669
sica (Acanthephyra) . . . 668
Sicyonia 635
sidneyi (Potamon) . . . 187
signata (Atergatopsis) . . 206
sima (Thalamita) . . . 175
simplex (Munidopsis . . . 493
sindensis (Uca inversa, var.) . 94

PAGE

siphonoceras (Solenocera) . . 612
skoogi (Paguristes) . . . 420
smithii (Antilibinia) . . . 38
smithii (Eriphia) . . . 274
smithii (Gonioneptunus) . 163, 818
smithii (Nautilograpsus) . . 120
smithii (Sesarma) . . . 124
smithii (Uca) 94
Solenocera . . . 582, 611
sordidus (Scyllarus) . . . 557
speciosa (Actaea) . . . 232
speciosa (Munida) . . . 492
speciosus (Petrolisthes) . . 478
Speodromia . . . 308, 333
Sphaerozius . . . 247, 253
spinifer (Pilumnus) . . . 263
spinetum (Problemacaris) . . 815
spinimanus (Mursia) . . . 356
spinosa (Exodromidia) . . 325
spinosa (Plagusia) . . . 136
spinosissima (Acanthophrys longispina, var.) 62
spinosissima (Calappa hepatica, var.) . . 347 footnote, 348
spinosus (Hyastenus) . . 53
spinulentus (Eupagurus) . . 460
spinulicauda (*Penaeopsis*) . . 597
spinulosus (Achaeopsis) . . 24
spiralis (Thaumastoplax) . . 301
Spirontocaris . . . 687, 695
splendens (Sergestes) . . . 642
splendens (Sergestes) . . . 642
spongiosa (Cryptodromidiopsis) . 329
squalina (Leucisca) . . . 371
squammosus (Scyllarides) . . 561
squamosa (Plagusia) . . . 134
squilla (Leander) . . . 783
squilla (Leander) . . . 784
squinado (Mamaia, var.) . . 59
stebbingi (Hexapus) . . . 299
stebbingi (Metapenaeus) . . 599
Stenocionops 3, 58
Stenopodidae 577
STENOPODIDEA . . . 576
Stenopus 577
Stenopusculus 577
Stenorhynchus 13
Stenorhynchus 13
Stereomastis . . . 567, 570
stewarti (Nephropsis) . . 531
stimpsonii (Angasia) . . . 708
stimpsonii (Cryptodromidiopsis spongiosa, var.) . . . 329
stormi (Geograpsus lividus, subsp.) 116
strenuus (Alpheus) . . . 760
streptocheles (Porcellana) . . 474
strigatus (Aniculus) . . . 431
strigosus (Grapsus) . . . 115
striolatus (Clibanarius) . . 434
Stylodactylidae . . 647, 651
Stylodactylus 652

PAGE

stylorostratis (Acanthephyra) . 666
subacutus (Lachnopodus) . . 236
subinteger (*Grapsillus*) . . 278
subserratus (Menaethius monoceros, var.) 43
subspinosa (Upogebia) . . 515
suhmi (Stereomastis) . . 574, 575
sulcatifrons (Eucrate) . . 295
sulcatifrons (Parapasiphaë) . 649
sulcatipes (Athanas) . . . 732
sulcatus (*Doto*) 99
sulcatus (Macrophthalmus) . 101
sundaicus (Palaemon) . . 775
superba (Coralliocaris) . . 799
symnista (Albunea) . . . 405
Synalpheus . . . 725, 735
systellaspis 663

T

taeniatus (Clibanarius) . . 434
taeniatus (Panulirus *ornatus*, var.) 553
Taliepus 36
talismani (Gennadas) . . . 633
talismani (Sergestes) . . . 642
taprobanica (Thalamita woodmasoni, var.) . . . 177
tenuicrustatus (Grapsus) . . 113
tessellata (Lybia) . . . 249
testudinarius (Remipes) . . 404
tetragona (Sesarma) . . . 125
Tetralia 248, 279
Thalamita . . . 142, 171
THALASSINIDEA . . 401, 497
thalia (Micippa) . . . 63
Thaumastoplax . . 283, 300
Thelxiope 338
Thelxiopeidae . . . 306, 338
Thelxiopeidea 306
Thenus 557, 564
Thompsonia 236
thomsoni (Achaeopsis) . . 25
thomsoni (Nephrops) . . . 528
tibicen (Calcinus) . . . 437
tigrina (Trapezia) . . . 277
timidus (Catapaguroides) . . 468
togoensis (Caridina) . . . 661
tomentosa (Actaea) . . . 233
tomentosa (Plagusia) . . . 136
tomentosus (Actumnus) . . 271
Tozeuma 707
Trapezia 248, 276
triangularis (Eupagurus) . . 464
triangularis (Schizophrys, var.) . 60
triarthrus (Hymenopenaeus, Haliporoides) 619
tricarinatus (*Evaxius*) . . 499
tricarinatus (Heterocarpus) . 682
Trichodactylus 180

PAGE

trichophoroides (Pilumnus, Heteropilumnus) 268
tridacnae (Conchodytes) . . 801
tridacnae (Ostracotheres) . . 82
trifurcus (Cymonomus) . . 392
Trigonoplax . . . 73, 75
trigonus (Linuparus) . . . 820
trimaculatus (Ovalipes) . . 150
trispinosa (Mursia armata, var.) . 356
trispinosus (Geryon) . . . 293
tristanensis (Eupagurus) . . 460
tristis (Liomera) . . . 237
tristis (*Carpilodes*) . . . 236
trisulcatus (Penaeus) . . . 584
trituberculatus (Lupa) . . . 153
truncatus (Gonioneptunus) . 164, 818
tuberculata (Ebalia) . . . 367
tuberculata (Plagusia depressa, var.) 134
tuberculatus (Scyllarus) . . 560
tuberculatus (Xenocarcinus) . 36
tuberculidens (Xanthias) . . 243
tuberculosa (Ebalia) . . . 368
tuberosa (Ebalia) . . . 367
tugelae (Hippolysmata, Exhippolysmata) 712
tugelae (Lupocyclus) . . . 148
turbynei (Platymaia) . 31, 816
Tylodiplax . . . 83, 107
Typhlocarcinus 297
typhlops (Polycheles) . 568, 575
typus (Caridina) . . . 655
typus (Leucifer) . . . 645
typus (Rhynchocinetes) . . 763

U

Uca 83, 89
uncifer (Hyastenus) . . . 54
undulatus (Dehaanius) . . 47
unguiformis (Elamena, Trigonoplax) 75
ungulatus (Phymodius) . . 216
ungulatus (Pylopagurus) . . 454
unidentata (Dromidia) . . 323
unirecedens (*Nauticaris*) . . 710
Upogebia 514
Upogebiidae . . . 497, 513
urania (Leucosia) . . . 387
Urocaridella 775
Uroptychidae . . . 471, 475
Uroptychus 495
ursus-major (Parribacus) . . 565
urvillei (Ocypode) . . . 86
urvillei (Uca) 93

V

vaillantianus (Liomera) . . 238
valens (Gennadas) . . . 631

PAGE

variabilis (Alpheus bisincisus, var.) 760
variabilis (Eupagurus) . . 464
variegata (Charybdis) . . 170
variegata (Philyra) . . . 382
variolosa (Actaea) . . . 235
varipes (Pagurus) . . . 429
Varuna 111, 121
ventricosus (Hippolyte) . . 704
ventrosus (Alpheus) . . . 748
verdi (Ibacus) 563
verreauxi (Jasus) . . . 540
verrucosipes (Pilumnus) . . 269
versicolor (Panulirus) . . 553
vespertilio (Pilumnus) . . 263
vestita (Carcinoplax) . . . 288
vestitus (*Curtonotus*) . . . 265
vetchi (*Epialtus*) . . 35, 73
victor (Matuta) . . . 358
victrix (Matuta) . . . 358
vigintispinosa (Gomeza) . . 305
villosus (Alpheus) . . . 744
violascens (Coenobita) . . 470
Virbius 702, 704
virescens (Clibanarius) . . 435
vittata (Hippolysmata) . . 710
vocans (Uca) 90
voeltzkowii (Xantho) . . 226
vulgaris (Clibanarius) . . 433

W

warreni (Potamon) . . . 189
westergreni (Notostomus) . . 670
whitei (Leucosia) . . . 386
Willemoesia 567
wilsoni (Petalomera) . . . 313
wood-masoni (Thalamita) . . 177
woodwardi (Funchalia) . . 609
wyckii (Caridina) . . . 657
wyville-thomsoni (Platymaia) . 31

X

Xaiva 142
Xanthasia . . . 78, 81
Xanthias 203, 241
Xanthidae . . . 77, 198
Xantho . . . 201, 202, 220
Xanthodes 241
xanthoides (Zozymodes) . . 211
Xeinostoma . . . 388, 395
Xenocarcinus 35
Xenophthalmodes . . 282, 296
Xiphocaris 653

Z

zebra (Eupagurus) . . . 459
zebra (Gnathophyllum) . . 765
Zoozymodes 211
Zoozymus 210
Zosimus 201, 210
Zozymodes . . . 201, 211
Zozymus 210